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No. 23

November 1922

SILENT READING:

A STUDY OF THE VARIOUS TYPES

By

CHARLES HUBBARD JUDD

and

GUY THOMAS BUSWELL



THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

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CHAPTER I

INTRODUCTION

No more striking example of the effect of scientific studies on school practice can be found than the present-day attention to the teaching of silent reading. A score of books have been published in the last three years which explicitly state that their chief aim is to contribute to the methods of teaching silent reading. Some teachers and principals are so inspired with enthusiasm for silent reading that they are advocating the abandonment altogether of oral reading, although oral reading is more strongly entrenched in the traditions of the schools than any other subject or method of teaching.

The discovery of silent reading is directly traceable to the work of educational psychologists. At a time when practical school procedure was ignoring entirely the distinction between oral reading and silent reading, laboratory studies began to make certain measurements which are the basis of the present-day reform. It was found by means of simple time-measurements that a skilful reader reads silently several times as fast as he reads aloud. Later it was shown by more elaborate methods why this is so. The element which makes oral reading slow is the relatively cumbersome process of pronouncing the words. This process cannot by any possible device be speeded up so as to equal in rapidity the processes of recognition and interpretation in the highly perfected form which these reach in a mature reader. A very common result of emphasis on oral reading during the whole school training is to fasten upon the pupil the limitations which are characteristic of oral reading. Recent investigations of the laboratory have made this clear by showing that the kind of reading exhibited by adults who are inefficient readers is usually the same as the kind of reading found in the case of immature readers who are at the early oral stages.

While scientific workers were making these discoveries, the schools continued to overlook the distinction between oral reading and silent reading. Throughout the elementary curriculum it was the practice to limit teaching of reading to class exercises in which the method was exclusively oral. To be sure, the teachers made the demand, especially from the fourth grade on, that pupils do much reading by themselves. Lessons were assigned in geography and history and other subjects which

required the independent mastery of textbooks, but no effort was made to supervise the pupils' reading habits during their perusal of these textbooks. It was assumed that a pupil could read silently with efficiency because he was reading orally in the formal reading class.

Scientific evidence in regard to the difference between oral reading and silent reading accumulated, however, until it became too impressive to be ignored. Not only so, but as soon as the distinction was clearly pointed out, practical school people began to realize that many of the troubles of the upper grades can be traced directly to the failure to give proper recognition to silent reading. The demand for a reform began to be voiced in many quarters and finally led to one of the most significant movements in modern education.

The general lesson to be drawn from the recent history of reading in the schools can be stated in a form which is very encouraging to the student of educational science. This lesson is that wherever the mental processes of pupils show fundamental differences, practical school procedure will have to fit its methods to these differences. If the mental processes involved in reading silently are different from the mental processes involved in reading aloud, the school will have to meet this difference with special methods. The program of co-operation between science and practical teaching is easy to lay out when we thus see the intimate relation between methods and psychological distinctions. The duty of the scientist is to devise methods of discovering and describing fundamental distinctions. The duty of the teacher is to develop practical ways of dealing with the various kinds of mental processes which are pointed out.

This monograph is a study of some of the more complex forms of reading. In the main, the types of reading dealt with are those which are usually carried on silently. For purposes of investigation it is sometimes desirable to require the subject to read orally some part of the exercise, but in such cases the oral reading is used primarily to check the silent reading. The real center of the investigation is silent reading.

The practical purpose of such an inquiry is to contribute those distinctions which will be suggestive to teachers who are trying to develop methods of supervising and teaching habits of effective silent reading. During the last few years it has become very evident that it is by no means as easy to teach silent reading as to teach oral reading. The symptoms of success or failure in the latter field are open to direct observation. In silent reading, on the other hand, the observable facts are relatively few and extremely difficult to interpret. This obscurity of the symptoms

of silent reading makes it doubly desirable that scientific methods be developed which will direct the attention of teachers to every discoverable indication of the character of the silent-reading process. The methods employed in discovering these indications may not be of a kind which teachers can use directly, but the results will be helpful in guiding practical observation and teaching.

The methods of the present inquiry are the complicated methods of the laboratory. By means of apparatus which has been fully described in an earlier study,¹ the eye-movements of a large number of pupils were photographed, and their habits of looking at the contents of the printed page were studied through comparisons of the resulting photographs.

It will, perhaps, make the later discussions easier to follow if the general psychological principles which issue from this study are briefly illustrated. To this end we may describe some of the typical results from the studies to be reported in the later pages of this monograph.

It is found that a pupil makes eye-movements which are different when he is asked, on the one hand, to read a passage with special attention to certain grammatical questions which he is to answer and when, on the other hand, he is asked to repeat the passage word for word at the conclusion of the reading. The characteristically different eye-movements which appear in these two cases make it quite certain that the demand for grammatical analysis and the demand for reproduction word for word cannot be fully met by the pupil through one and the same kind of attention. While he is attending to grammar, he is in one frame of mind, and he makes one kind of attack on the printed page. While he is reading for the purpose of reproducing verbatim, he is in a different attitude.

There is a popular psychology which assumes in a vague way that reading is the recognition of words and that all recognition of words is very much the same, whatever the conditions under which recognition takes place. This popular psychology, if it formulated itself, would say that there is stored somewhere in the mind a something which may be called the interpretation of a word. This interpretation is sometimes called a mental image. When the reader opens his eyes and sees the written or printed word, the interpretation or mental image is supposed to be drawn out of its pigeonhole and tied, by what the older psychologists called an association, and by what some recent writers have called a bond, to the impression received. The visual impression and the interpretation

¹ Clarence Truman Gray, *Types of Reading Ability as Exhibited through Tests and Laboratory Experiments*, Supplementary Educational Monographs, Vol. I, No. 5, pp. 83-91. Chicago: University of Chicago, 1917.

thus bound together by some kind of link are supposed to make up a unit or element of mental life. The business of the teacher is considered by this simple-minded type of psychology to be the business of tying up impressions with mental images. The mind is thought of as a kind of storehouse in which many hundreds or thousands of such linked couples are deposited.

Thus, there are teachers who feel that they can teach a word in a single lesson. They write a word on the blackboard and tell the pupil by definition what it means. They forget that in real life the word will always turn up as part of a sentence and that it will have a peculiar shade of meaning through its contrast with other words or through its special relation in the total idea conveyed by the sentence. The notion that a word and its meaning are two fixed pieces of experience which can be tied together is a purely mechanical theory and not adequate as a basis for real teaching.

The simple mechanical explanation just outlined is very satisfying to some minds, because it reduces all teaching to the same formula. There is nothing distracting about the instructor's problem if one has this straightforward, uncomplicated creed. One can teach little children and big children in the same way. All one has to do is to set up more and more combinations and strengthen them through repetition.

The type of popular psychology described in the foregoing paragraphs finds very little support in analytical studies such as the present monograph reports. A printed page turns out to be, as shown by this study, a source of a mass of impressions which the active mind begins to organize and arrange with reference to some pattern which it is trained to work out. If the mind is fitting together the impressions so as to bring into high relief grammatical distinctions, the grouping of words and the distribution of emphasis will be according to one pattern. If the mind is intent on something wholly different from grammar, as, for example, the experiences which the author is trying to picture, the whole mental and physical attitude of the reader will be very different.

Perhaps the most striking example which can be anticipated from the later results is the example of Latin teaching. Pupils in the third year of Latin do not read the words which are offered to them. The obvious fact shown by their eye-movements is that they do not even remotely approach the reading attitude. It is as inappropriate to speak of reading in describing what Latin students do in the high school as it would be to use the word "flying" in describing what people do when they walk. The whole nervous and muscular mechanism involved in

flying is different from the nervous and muscular mechanism involved in walking.

It is entirely thinkable, of course, that the purpose of Latin teaching is something other than to teach pupils to read the text. In that case such investigations as those reported in the following pages will be useful in that they will help everybody to arrive at a knowledge of the mental pattern or attitude which is in reality cultivated in Latin classes. At the present time there is a great deal of vagueness about the matter because of the prevalence of the popular type of psychology discussed in earlier paragraphs. ✓ Given a printed book, a pair of eyes, an active brain, and it is assumed that whatever associations are being set up must be of the same general type as those set up when a book printed in the vernacular is similarly held before eyes and an active brain. The fact is that a great variety of results can issue from the coming together of books, eyes, and brains; some are useful and some are worse than useless; some develop personality and some pervert human energy. The business of the student of educational science is to discover the various ways in which impressions can be organized, to bring to the practical teacher such fundamental distinctions as he can discover, and to co-operate in this way in promoting the adoption of the best possible educational methods. The grammatical attitude is not the same as the attitude of reading for understanding a scene; nor are the grammatical attitude and the drama attitude interchangeable parts of a single mental complex. The vocabulary-translation attitude of the high-school pupil who is studying Latin is not the same as the attitude of one who is absorbed in the appreciation of a literary masterpiece. ✓ Mental life is a complex of organized attitudes, not a collection of mechanical associations or bonds.

One final introductory comment may be added in order to describe more fully the purposes of this monograph. It reports an effort to carry experimental analysis of school processes into the domain of the upper grades and the high school. It was entirely natural that laboratory studies of school processes should deal at first with the problems of elementary instruction. It is entirely understandable that high-school teachers have exhibited only a moderate interest in much of the work that has been done in educational science. The altogether obvious reasons why high schools have been aloof from the general scientific movement in education cannot, however, be accepted much longer by high-school teachers as justification for failure to apply scientific methods to the solution of their problems. The fact is that the complex processes which appear in the later stages of school training furnish the most inviting

opportunities for scientific analysis. The experience of the last few years has demonstrated in striking fashion the possibility of vastly improving teaching through minute analyses which break up elementary subjects which have long been taught by uniform procedures at different levels, into numerous, distinguishable, special aspects of school work. It is legitimate to expect that analyses will be equally useful in improving high-school methods. If there are failures in algebra and geometry, the problem of education is to find out why the failures occur, and to discover the points at which more effective methods can be applied. There is need of training in methods of silent reading of science material, and there is need of a different type of training in the silent reading of literature. Even a superficial consideration of these two kinds of silent reading will convince the thoughtful teacher that he ought at least to inquire whether the methods in the one case apply also to the other. Thus, it is seen that the manifoldness of instruction at the high-school level brings with it the demand for more extended analyses than at any point lower down in the schools.

This monograph lays its chief emphasis on facts and conclusions which ought to be influential in affecting the teaching of the upper grades and of the high school.

CHAPTER II

ADJUSTMENTS IN READING TO CHANGES IN THE CONTENT OF PASSAGES

One of the statements very commonly made about passages which are assigned to be read is that they are easy or difficult. Such a statement may refer to a variety of characteristics. One type of difficult passage is made up of long words or unfamiliar words; the seat of the difficulty in such cases is the vocabulary. In other cases it may be the sentence structure which is complex or drawn out to such an extent that it taxes the reader's attention. Again, the logic of a discussion may be difficult to follow; the reader will in such a case, perhaps, know all of the words and be able to follow the sentence structure, but will have difficulty with the thought.

As a first step in the analysis of the mental processes which are involved in reading difficult passages, photographs were taken of the eye-movements of ten pupils in the fifth grade while they were reading Paragraphs 4, 6, 8, 10, and 12 from Gray's Standardized Reading Paragraphs. This gave fifty records for comparative study. The paragraphs are carefully standardized to measure oral reading and are known in their own field to be of equal steps of increasing difficulty. Difficulty is not here analyzed into its elements. As a matter of fact, there are changes in vocabulary, in length of sentences, and in complexity of logic. It should be noted that the paragraphs are not standardized for the type of reading for which they were used in this experiment, namely, silent reading.

The purpose of this first inquiry was to find out what a pupil does when he is confronted with a series of passages which can be described in general terms as increasingly difficult. Before the general table of results is presented, it will be well to discuss in detail the records of several individuals and their methods of dealing with the types of increasing difficulty found in these paragraphs.

Table I shows the facts for Subject D.S. It will be noted that there are two ways in which this subject meets difficulties. Either he makes more fixations per line or he increases the average length of his fixation pauses. If we compare Paragraph 6 with Paragraph 4, we see that the chief change is in the number of fixations. If we compare Paragraph 8 with Paragraph 6, we see that the major adjustment is in the length of the fixation pauses.

The psychological process which is going on when the number of fixation pauses increases is clearly shown in the column in Table I which records the average number of words read per fixation. The amount of material which is recognized in a single fixation becomes smaller with increasing difficulty. The pupil has to take in such a word as "philosophers" or "statisticians" in two or more fixations, while the words "it is better," which appear in an easy passage, are taken in at a single glance.

TABLE I*

RECORD OF SUBJECT D.S. IN SILENT READING OF PARAGRAPHS OF INCREASING DIFFICULTY SELECTED FROM GRAY'S STANDARDIZED READING PARAGRAPHS

Paragraph	Average Number of Fixations per Line	Average Duration of Fixation Pauses†	Number of Words Read	Average Number of Words Read per Fixation	Total Time for Five Lines†
4.....	5.2	5.4	45	1.73	136
6.....	6.2	5.5	49	1.58	164
8.....	5.8	6.4	42	1.44	186
10.....	5.6	6.0	34	1.21	168
12.....	6.8	7.4	32	0.97	225

* In all of the calculations of averages from eye-movement records, the first line and the last are omitted, because it has been shown in earlier investigations that these lines are of special character. The figures presented in the tables are, therefore, from the second line to the next to the last, inclusive.

† The time unit used in all of the tables is one twenty-fifth of a second.

The facts here described have led to the use of the term "span of recognition" in describing the reader's mental achievement in taking in reading matter during a single fixation.

Evidently the immature reader will have a narrow span of recognition. Correspondingly, when the content of a passage becomes increasingly difficult for a mature reader, he is thrown back by the increasing difficulty into the class of immature readers with reference to that particular passage. Each step in his mental endeavor then covers less ground, because for each impression received he must carry on a more elaborate and laborious process of interpretation.

There is, however, a second expedient which the reader can adopt in the presence of a difficulty. He may take in a considerable body of impressions and spend more time in trying to master that which confronts the eye. If one can have more time to collect experiences which will interpret a phrase, one may be saved the necessity of cutting down the amount which one is trying to take in. This is what Subject D.S. does in the case of Paragraph 8.

Incidentally, the table shows something with regard to the structure of Gray's test. Paragraphs 4, 6, and 8 are made up of words of about the same length. The "hard" paragraphs, 10 and 12, contain long words. These are what make the passages especially hard to read orally. Evidently Subject D.S. did not find Paragraph 10 as difficult in some respects as Paragraph 8. When we consider the number of words read per fixation, however, we see that there was a contraction of the individual recognitions even in this case. This must mean that the contraction of the span of recognition was common to all of the paragraphs as compared with the first, while the longer fixation pauses in such cases as Paragraph 10, when compared with Paragraph 6, mean more complicated efforts at interpretation.

Another type of adjustment to difficulty appears when we study the detailed record of Subject M.B. This record is given in Table II.

TABLE II
RECORD OF SUBJECT M.B. IN SILENT READING OF PARAGRAPHS OF
INCREASING DIFFICULTY SELECTED FROM GRAY'S
STANDARDIZED READING PARAGRAPHS

Paragraph	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Words Read per Fixation	Total Time for Five Lines
4.....	7.0	5.1	1.29	178
6.....	8.2	5.5	1.19	225
8.....	11.2	5.5	0.75	308
10.....	6.2	6.5	1.09	201
12.....	11.0	6.9	0.58	379

Subject M.B. shows a very sudden change in her methods of meeting difficulty. Through the first three paragraphs she increases the number of fixations per line. In Paragraph 10 she adopts the method of lengthening the fixation pause.

It is not easy to explain this series of records. Paragraph 8 has fewer words than Paragraph 6, as shown in Table I. We cannot, therefore, attribute the increase in number of fixations to concentration on single words. We must look for an explanation in the varying contributions which individual experiences bring to the interpretation of passages. Very striking evidence of this appears in the fact that the subjects reported in Tables I and II proceeded by wholly different modes of adjustment. If special attention is given to the last columns in the two tables, the suggestion naturally comes to mind that the differences in method of

The hypotheses concerning physical phenomena formulated by the early philosophers proved to be inconsistent and in general not universally applicable. Before relatively accurate principles could be established, physicists, mathematicians, and statisticians had to combine forces and work arduously.

PLATE I.—Silent-reading record of Subject C. W. Numerous omissions of difficult words. (Each vertical line shows the position of a fixation. The numbers at the upper ends of the lines show the serial order of the fixations. The numbers at the lower ends of the lines show the length of the fixations in twenty-fifths of a second. An X at the lower end of a line indicates that the record was illegible. A crooked or oblique line means a movement during the period of fixation.)

1 2 3 4 5 6 7 8 9 10 12 11 13
 | The hypotheses concerning physical phenom-
 10 5 X X X G X 24 4 8 8 8 5

1 2 3 4 5 6 7
 | ena formulated by the early philosophers proved
 20 12 6 6 14 36 8

1 3 2 4 5 6 7 8 9
 | to be inconsistent and in general not universally
 5 10 3 10 7 5 6 7 9

2 4 3 1 6 5 7 10 8 9 13 11 14 12 15 16
 | applicable. Before relatively accurate principles
 19 11 34 8 4 8 8 7 16 12 10 5 13 9 22^o 5

1 2 7 5 6 3 8 4 15 9 12 11 13 10 14
 | could be established, physicists, mathematicians,
 8 10 X 11 16 7 X 4 8 10 7 6 6 12

1 3 5 2 4 6 7 8
 | and statisticians had to combine forces and work
 8 20 X 15 17 6 6 7

2 3 1
 | arduously. | |
 21 9 X

PLATE 2.—Oral-reading record of Subject C.W. Record subsequent to that shown in Plate 1.

adjustment arise from the fact that Subject M.B. is a slow reader. This fact, in turn, is illuminated by a comparison of the two columns showing the average number of fixations per line. The major reason why Subject M.B. is slow is that she makes many fixation pauses. Her adjustments to difficulty follow the line of her general habit until the number of fixations becomes excessive, as in Paragraph 8, whereupon a radically different method appears in the next paragraph.

A third interesting case is exhibited in Plates 1 and 2. Subject C.W., who seemed on the face of the results to break all of the rules, read Paragraph 12 as shown in Plate 1. It was so evident from this record that this subject was omitting, in his silent reading, all of the words which were inconvenient that he was asked to read the same paragraph out loud, with the result shown in Plate 2.

TABLE III
RECORD OF SUBJECT M.H. IN SILENT READING OF PARAGRAPHS
OF INCREASING DIFFICULTY SELECTED FROM GRAY'S
STANDARDIZED READING PARAGRAPHS

Paragraph	Average Number of Fixations per Line	Average Duration of Fixation Pauses
4.....	6.0	5.8
6.....	4.2	7.4
8.....	6.3	6.7
10.....	7.4	6.8
12.....	8.2	7.9

These plates can hardly be said to show a method of meeting difficulties, but they exhibit the method of poor reading which many pupils doubtless adopt in dealing with such reading matter as they encounter in some of their lessons.

A fourth case in this series presents another type of adjustment to difficulty which is worth noting. The facts are shown in Table III. The striking feature of this table is the contrast of method shown in the different paragraphs.

Enough has been given of the details in this part of the investigation to prove, first, that an increase in the difficulty of passages results in a change in the reader's attitude toward the task which he is undertaking. There are various ways of meeting the complex situations that arise. The assumption that any single formula of simple association between words and their meanings can be made the basis of teaching is immediately discredited by an examination of such details as have been presented

in these records. It is also evident, in the second place, that complex reading processes can be understood only when individual pupils are studied. General tables of median practices are suggestive, perhaps, as showing general tendencies, but they do not reveal the essential facts, because these facts are different for different individuals.

In Table IV are presented the medians for ten pupils, including the four to the discussion of whose records the foregoing paragraphs have been devoted. This table serves to emphasize the general fact that increased difficulty of passages means new combinations of scope and duration of attention, but the series of figures presented should be interpreted also in the light of the individual variations set forth in the foregoing tables. The medians cover up the manifold variations which in fact appear in

TABLE IV
MEDIAN OF THE RECORDS OF TEN FIFTH-GRADE PUPILS.
SILENT READING OF PARAGRAPHS OF INCREASING DIFFICULTY
SELECTED FROM GRAY'S STANDARDIZED READING
PARAGRAPHS

Paragraph	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Words Read per Fixation
4.....	6.0	5.9	1.50
6.....	7.0	6.1	1.40
8.....	7.2	6.2	1.16
10.....	6.4	6.2	1.06
12.....	7.8	6.9	0.82

the changes which, as we have seen, emphasize now one, now the other, mode of adjustment.

The qualifying statements made regarding Table IV should be kept in mind throughout this monograph as ample justification for constant insistence on individual analysis. There can be little doubt that all of the more complex processes are highly individuated. They are, as was pointed out in the introductory chapter, complex patterns, not uniform mechanical structures. As complex patterns, they are more dependent on subjective factors, such as acquired tendencies with regard to frequent pauses in reading, than on any external impressions.

The results which have been reported up to this point were confirmed and amplified by a series of photographs of the eye-movements made by university students. Five students were asked to read long passages of different types of reading matter. Thirty-six lines of each type were read silently by each subject, and seven varieties of material were used.

The¹old² football⁴ scrimmage³ smile⁵ was⁶ on⁸ Shock's⁷ face³ as⁵ he¹⁰
 stood⁵ waiting¹ for² Carroll⁴ to³ rise.⁵ The⁶ whole⁷ incident⁶ had⁷ oc-
 curred¹ so² unexpectedly³ and⁴ so⁵ suddenly⁵ that⁵ the⁵ crowd⁶ stood⁴
 amazed,² quite¹ unable³ to⁴ realize⁴ just⁵ what⁷ had⁵ happened.⁶

PLATE 3.—Silent-reading record of Subject G.H. Simple prose fiction

In using Mercator's Projection, the most common world map,
 it is well to remember that while the relative positions of the
 earth's features are here correctly indicated, the areas are neces-
 sarily distorted and appear all out of proportion. In fact, the

PLATE 4.—Silent-reading record of Subject G.H. Passage from a geography text

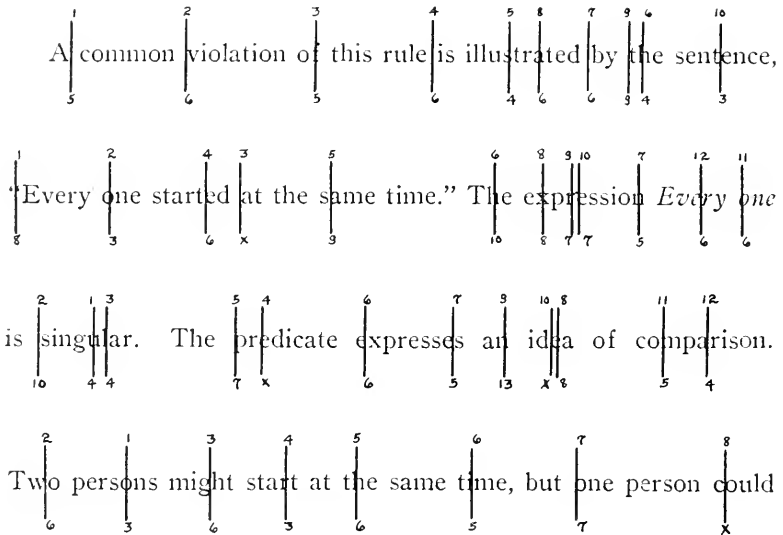


PLATE 5.—Silent-reading record of Subject G.H. Passage from a textbook on rhetoric.

It was ² many ³ a year ^{1 4} ago, ⁵

7 3 4 5 5

In a ^{2 1} kingdom by the ^{4 3} sea,

5 6 4 4

That a ^{2 1} maiden there ^{6 3 5} lived ^{7 4} whom you ⁸ may ⁹ know

6 6 3 8 5 6 5 6 3

By the ¹ name of ² Annabel Lee;

10 4

And this ¹ maiden she ² lived with ³ no other ⁴ thought ⁵

6 4 7 8 6

Than ¹ to love and be ² loved by ³ me. ⁴

7 4 7 4

I was ^{2 1 3} a child and she ^{4 5} was a child,

8 6 6 7 4

In this ^{2 1} kingdom by the ³ sea,

3 9 5

But ^{3 2 1} we loved ⁴ with a love ⁵ that ⁶ was ⁷ more than ⁸ love,

3 5 5 8 4 5 3

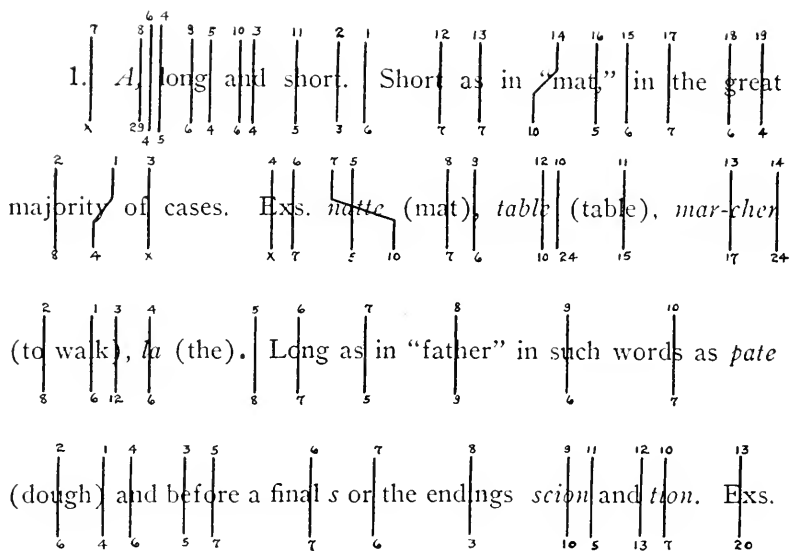


PLATE 7.—Silent-reading record of Subject G.H. Passage from a French grammar

1 2 3 4 5 6 7
 No more talk of God or Angel guest
 15 5 7 6 3 7 6

2 1 3 4 5 7 6 11 10 8 12 9
 With man, as with his friend, familiar used
 5 4 5 6 9 7 6 5 8 7 3 6

1 2 4 3 5 6 7 8
 To sit indulgent, and with him partake
 7 6 5 4 3 6 5 6

1 3 2 4 5 6 7
 Rural repast, permitting him the while
 7 7 6 7 5 5 8

PLATE 8.—Silent-reading record of Subject G.H. Difficult poetry

Such algebraic expressions as x^2 , a^2 , mn^2 , $2mn$, etc., which

may be represented by areas of geometric figures, are *second*

degree expressions. In a second degree expression, at least one

term must have two literal factors. If these two factors are

PLATE 9.—Silent-reading record of Subject G.H. Passage from a text in algebra

The differences here dealt with were like those presented to the pupils of the fifth grade—differences in difficulty—but they were also qualitative differences. The following list will indicate the range of passages. Two poems were used: *Annabel Lee*, as an example of easy verse, and a section from *Paradise Lost*, beginning, "No more talk of God or Angel guest," as an example of blank verse. Prose extracts were taken from a book of fiction, a textbook on geography, a textbook on rhetoric, a French grammar, and a textbook on algebra.

Inspection of the records made by the readers of these different types of reading matter arouses a vivid realization of the different types of mental attitudes in the readers' minds. Plates 3-9 exhibit records from a single subject, G.H., and present in each case a few typical lines. They are arranged in the order of their difficulty, as indicated by the average number of fixations per line. This order holds also for the average duration of fixation pauses, except that Plates 7 and 9 would have to be interchanged if that basis of arrangement were adopted.

Attention may be called to a number of significant details in the plates. The fiction is read with uniform, short fixations which show by their relatively small number per line and by their uniform distribution and brevity that the reader is encountering no difficulties. The simple reading in rhetoric and geography is regular but requires a slightly higher degree of mental effort, as attested by the increased duration of the fixation pauses. When we come to the poetry and to the French grammar, we find that the movements are jerky and often quite irregular.

The train of experiences which comes to a reader who moves his eyes haltingly across a line is different in quality from the train which comes when the eyes move freely and smoothly. The reader will not be conscious of the eye-movements as separate items of experience, but he will be aware of a certain roughness and unevenness of ideas and impressions.

It is not, however, these consequences of eye-movements which are of major importance for our study. Eye-movements are but external manifestations of an inner condition which is set up in the central nervous system. Whenever there is a jerky, irregular eye-movement and a short span of recognition, there is a central nervous process which is also irregular and of short duration. Modern psychology has made its most fruitful advances by recognizing the intimate relation of external behavior and its accompanying conditions in the nervous system to conscious experience. The impressive fact about changes in eye-movements is, accordingly, not some consequence of this or that mode of fixation but the radical change in the total attitude of the reader in the different cases. The muscular tension which is exhibited in reading French grammar is

wholly different from that exhibited in reading fiction. This means that the central nervous tension in one case is very different from that in the other case.

Nor should the fact be overlooked that these differences are not limited to particular and individual eye-movements and single fixations. The whole succession of acts is in the one case free and in the other case restrained and even cramped in range.

The conscious individual who is manifesting these differences is located at the center of the whole situation, that is, his consciousness reflects what is going on in the central nervous system. He is not aware of the eye-movements, but his awareness of the passage is of the type which is conditioned by the inner tension of his nervous system. Eye-movements are as direct measures of the mental state as the rate of the pulse is a measure of the heart-beat. The heart-beat, in turn, is not significant for its own sake, but because it is part of the patient's general organic condition. The rate of the pulse is invaluable as a means of diagnosis because it is a part of the total organic situation.

The significant lesson to be drawn from such records as appear in Plates 3-9 is that there are many different modes of reading. Different kinds of material induce different reading attitudes. It would be an entirely false description of the central nervous condition as exhibited through these eye-movements to say that the words are coupled with their respective meanings in the same way in the various passages and that the more difficult passages are merely larger aggregations of words plus meanings. The truth is that there is a new general tension in every case in which a collection of words begins to require more effort. The whole organism is drawn into the performance. Every movement of the eye is different, showing that the motor impulses are flowing in the one case out of one kind of a central nervous situation and in the other case out of a different kind of central nervous situation.

This mode of understanding experience is not so simple and mechanical as the theory of associative tracts and bonds, but it is more in keeping with the general experiences of teachers. No practical teacher can be told that the ease and interest in reading a story are to be explained by the same formula as the drudgery and feeling of resentment with which many of the same words are often read in trying to learn a lesson in geography. One situation is explained by a certain kind of nervous tension, the other by a different kind. Consciousness is in the one case a pattern or an organized whole of one type; in the other case the words enter into a wholly different pattern.

These conclusions can be reinforced by adding to the records of a single subject Tables V, VI, VII, and VIII, showing in full the facts regarding the eye-movements of four readers. These tables are not as picturesque as the records themselves, and they introduce new complications in the form of contrasts between individuals. They will repay careful study, however, because they show very impressively that there are many different kinds of silent reading.

TABLE V

RECORD OF SUBJECT G.H. IN SILENT READING OF DIFFERENT KINDS OF PASSAGES

Type of Material	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Regressive Movements
Fiction.....	6.1	5.7	3.0
Geography.....	7.3	5.9	1.1
Rhetoric.....	8.6	6.0	1.5
Easy verse*.....	9.4	6.1	1.9
French grammar.....	10.6	7.5	2.3
Blank verse*.....	11.9	6.8	2.6
Algebra.....	12.5	6.6	3.1

*Since the lines in the passages of poetry are not equal in length to the lines in the prose passages, the number of fixations is weighted so as to correspond to the number that would appear if the lines were of the length of those in the prose passages.

TABLE VI

RECORD OF SUBJECT L.M. IN SILENT READING OF DIFFERENT KINDS OF PASSAGES

Type of Material	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Regressive Movements
Fiction.....	8.5	4.9	2.1
Geography.....	11.2	5.2	3.2
Rhetoric.....	11.7	5.0	3.7
Easy verse.....	13.1	5.0	3.7
French grammar.....	14.1	5.1	4.0
Blank verse.....	16.8	5.2	6.1
Algebra.....	14.4	5.3	4.5

The first observation which is to be made regarding Tables V-VIII is that not all of the subjects exhibit the same order of increasing number and duration of fixations. Every table shows that fiction is the easiest kind of material used. There is, on the other hand, little agreement regarding the most difficult passage. Especially impressive, perhaps, is the difficulty exhibited by C.B. in reading *Annabel Lee*.

The explanation of the contrasting attitudes of various readers in dealing with difficult types of reading matter is not far to seek. One reader is absorbed in mathematics and to him this subject is almost as easy as fiction, while another reader finds mathematics difficult to a degree that makes it utterly distasteful. Individual training in these two cases has been entirely different. Even if the two readers grew up in the same

TABLE VII
RECORD OF SUBJECT P.M. IN SILENT READING OF DIFFERENT
KINDS OF PASSAGES

Type of Material	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Regressive Movements
Fiction.....	6.2	5.6	.21
Geography.....	7.9	6.3	.65
Rhetoric.....	7.7	5.9	.62
Easy verse.....	8.4	6.7	.32
French grammar.....	8.0	7.0	.43
Blank verse.....	8.5	6.5	.52
Algebra.....	9.5	6.1	.57

TABLE VIII
RECORD OF SUBJECT C.B. IN SILENT READING OF DIFFERENT
KINDS OF PASSAGES

Type of Material	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Regressive Movements
Fiction.....	8.0	5.9	.4
Geography.....	8.5	6.3	1.2
Rhetoric.....	8.3	5.9	1.5
Easy verse.....	10.0	6.8	1.2
French grammar.....	11.8	6.8	2.3
Blank verse.....	9.6	6.3	1.4
Algebra.....	8.1	6.6	1.0

environment, even if industrious and conscientious school officers offered to both exactly the same opportunity to cultivate the reading of mathematics, the contrast would persist. The contrast would probably grow more and more marked with progressive drill. One reader swings into an easy, fluent stride and shows interest and comprehension when he reads about algebraic formulas; another halts and stumbles and grows afraid. The attitude which one cultivates often becomes more and more fixed through repetition. It has long been clear to psychologists that

repetition often makes a bad situation worse. Bad kinds of central nervous tensions lead to habits just as much as do good kinds of tensions. It comes to pass, accordingly, that mature individuals are more and more sharply distinguished from each other as experience accumulates.

There are other contrasts which Tables V-VIII bring out. Subject L.M. meets all of his difficulties by readjusting the number of fixations per line. There is very little variation in the length of his fixations. Subjects G.H. and P.M., on the other hand, show a variation of several points in the duration of fixations and thus counterbalance somewhat their changes in the number of fixations.

In view of the results obtained in an earlier investigation¹ which compared the average duration of the fixation pauses of a large number of subjects, it is known that a fixation period of five to six twenty-fifths of a second is a close approximation to the best accomplishment of the ordinary reader. It is safe, therefore, to assume that Subject L.M. is regular in the length of his fixation pauses because he has reached approximately the lower limit of duration for a reading pause. Furthermore, the uniformity which his records exhibit in this respect suggests that increasing expertness in recognition leads to increased uniformity. This subject's adjustments do not tend to modify the element of his behavior which has reached a point very near to perfection. All of the other subjects have average durations which show that they are less highly practiced in rapid recognition than is L.M. The irregularities in their records can probably be explained by their lack of fixed habits in this respect.

It is interesting to inquire whether two individuals differ from each other with regard to their speed of reading in the same way throughout the series. For the purpose of illustration, we may compare Subjects G.H. and L.M. In reading fiction, Subject G.H. has the advantage to such a degree that in a given length of time he reads 19 per cent more than Subject L.M. The advantage lies with Subject G.H. in geography to the extent of 35 per cent; in rhetoric, 13 per cent; in easy verse, 14 per cent; and in blank verse, 8 per cent. On the other hand, the advantage lies with Subject L.M. in French grammar, 10 per cent; and in algebra, 21 per cent. Evidently, therefore, there are marked individual adaptations to varieties in reading matter.

Inspection of Tables V-VIII shows that Subjects P.M. and C.B. show exceptional facility in their reading of algebra.

¹ Guy Thomas Buswell, *Fundamental Reading Habits: A Study of Their Development*, Supplementary Educational Monographs, No. 21. Chicago: Department of Education, University of Chicago, 1922.

Other comparisons can be made. Thus, all of the varieties of adjustment, as between number and duration of fixations, which were noted in the first half of this chapter reappear in these tables. In reading French grammar Subject C.B. exhibits long pauses and a large number of fixations, while Subject P.M. shows long pauses and a relatively small number of fixations. Subject P.M. shows a very marked difference between fiction and geography, while C.B. shows relatively much less variation in the two records.

One general fact should be noted in connection with all of these records. The number and length of fixations are relatively great as compared with those recorded in many of the earlier studies of eye-movements. This shows that throughout we are dealing with difficult types of reading.

The findings of this chapter can be directly related to the well-known facts of ordinary life. Teachers know that whenever pupils pass from one kind of reading matter to another there is a change in the rate of reading. This change in rate is conditioned by a change in the number and duration of fixations. The rate is not significant in itself, but as an indication of differences within the subject's mental life it is a matter of the largest interest to teachers.

What is needed in addition to a knowledge of the gross fact of change in rate is insight into the complex of facts which cause the change in rate. Teachers need to know that some pupils require for improvement training in rapid observation, while others require training in the experiences which will supply the ideas necessary to facilitate interpretation. Above all, teachers need to realize that a slow rate of reading shows that the pupil's equipment is in some respect incomplete.

School methods must be devised which will help pupils to improve their reading far beyond the point which is now ordinarily thought of as constituting the terminus of instruction in reading. There ought, for example, to be a technique of teaching high-school students to read algebra fluently and intelligently. There ought to be teaching of methods of reading science. These higher applications of reading ability are not to be ignored or thought of as automatically provided for by training given through the reading of fiction or poetry.

CHAPTER III

EFFECTS OF CHANGES IN THE READER'S ATTENTION

Given exactly the same kind of reading matter, it is possible at different times to induce in the reader wholly different kinds of attention. The reading processes will then reflect not so much the uniformity of the passages as the differences in the mental attitudes with which the reader approaches his tasks. In ordinary life we know full well that a reader may read carelessly if he does not see the relation of reading to his personal interests, or he may be induced to read most carefully if he is offered such an incentive as the promise of a reward. One may, through an exercise of his own volition, read rapidly or deliberately. The results of these various types of reading, as indicated by the different degrees of comprehension of what has been read, are known to be in many cases strikingly different. It will be the task of this chapter to make an analysis of several typical reading attitudes and to ask what are some of the details of the reading process when the reader is in one attitude or the other.

The first experiment was tried with fourteen sixth-grade pupils, five high-school pupils, and one college student. A passage from Thorndike's Alpha Reading Test was given to these subjects, and they were first asked to read it as they would read an ordinary newspaper item. The exact directions were: "Read this paragraph through once silently. Read it very rapidly as you would read a newspaper article, just to find out what it is about." Immediately after the first reading the subjects were instructed: "Now read it again more carefully. When you finish, you will be asked questions about it."

Table IX gives the results for the twenty subjects. A number of important facts can be pointed out in this table. First, the different individuals reacted in very different ways to the two sets of conditions. Subjects 199 and 203 behaved in almost exactly the same way in the two cases, while Subjects 198 and 86 lengthened the duration of fixations and also increased the number of fixations to a very marked degree. Subjects 202 and 97 increased the number of fixations, but counterbalanced this by a reduction in the duration of the fixations, while Subject 89 reversed the relation between the number and the duration of the fixations.

There is one general difficulty in interpreting the figures in Table IX; this difficulty does not invalidate the contrasts pointed out when comparisons are made between various individuals, but it does obscure somewhat the meaning of the records of an individual when considered by themselves. The readers carried over from the first reading to the second some familiarity with the passage and, consequently, there must have been a very strong tendency to make in the second reading a much

TABLE IX

VARIATIONS IN READING DUE TO THE ATTITUDES OF RAPID READING AND STUDY

SUBJECT*	AVERAGE NUMBER OF FIXATIONS PER LINE		AVERAGE DURATION OF FIXATION PAUSES		AVERAGE NUMBER OF REGRESSIVE MOVEMENTS PER LINE	
	Rapid Reading	Study	Rapid Reading	Study	Rapid Reading	Study
202.....	6.9	11.5	6.2	5.8	0.9	2.8
201.....	6.6	9.1	6.8	7.9	0.5	0.9
200.....	4.3	6.1	6.1	6.3	0.4	1.1
199.....	10.6	10.5	5.6	5.5	2.0	1.9
198.....	8.8	14.0	5.6	6.0	0.3	2.5
86.....	7.6	11.0	5.5	6.6	0.8	1.8
87.....	8.6	9.4	5.2	5.6	1.3	1.6
99.....	7.3	7.8	6.2	5.6	1.1	1.0
91.....	8.6	10.5	6.1	7.0	1.1	1.5
95.....	7.4	8.0	5.1	5.9	0.8	1.3
96.....	6.6	9.4	5.4	6.0	1.1	2.3
94.....	10.4	10.0	5.6	6.4	2.6	2.1
104.....	8.0	14.1	4.9	5.0	1.4	3.9
103.....	14.3	13.0	6.2	6.1	5.8	3.7
97.....	8.1	10.6	6.4	6.0	0.8	1.5
203.....	7.5	7.8	7.6	7.7	0.7	1.4
89.....	9.0	7.6	5.8	6.3	2.1	1.8
100.....	9.1	9.9	7.4	7.3	1.9	2.0
90.....	7.6	8.0	5.2	7.3	1.6	2.7
102.....	7.3	8.1	5.4	6.4	1.3	1.1

* The records reported in this table are for subjects whose other records are discussed in Buswell's *Fundamental Reading Habits: A Study of Their Development*. The designations here used for subjects are the same as those employed in the earlier monograph.

better record than would have been made if the passage had been wholly unfamiliar. When, therefore, we find, as in the case of such a reader as Subject 198, a marked increase in the number and duration of fixations, this must mean that the change in the reader's attitude due to the exhortation to read carefully is even more marked than the statistics show.

The last two columns of Table IX, those dealing with regressive movements, are instructive. In the great majority of cases the direction

to read carefully resulted in increased frequency of movements of the eye back along the line. This can be understood if one thinks of a regressive movement as implying in many cases a tendency of the reader to analyze the sentence which he is reading. As his eye moves forward and interpretation progresses, it occurs to him to compare a phrase which he passed over a moment ago with his present interpretation. He, therefore, goes back and gives attention once more to an earlier part of the passage.

Further light on the methods of reacting to the two sets of conditions here under consideration can be gained from a detailed examination of some of the individual records. Plates 10 and 11 exhibit the first four lines of the first and second readings of Subject 198. A comparison of these plates makes it clear that the changes in eye-movements resulting from a change in the subject's attention are not limited to single points. Every line in the first reading is in fundamental character like every other line in the first reading and strikingly different from every line in the second reading. Again, the lines in the second reading are like each other. During the first reading the subject moves from fixation point to fixation point with steps that are uniform, and the durations of the successive fixation pauses are enough alike to make it evident that the reader is complete master of the situation and is conscious of the steady progress of interpretation. The second reading is evidently of a different type throughout its entire course. The steps between fixation pauses are short. Some of the fixations are very long, and the whole picture is one of an entirely different type of attention from that exhibited in the first reading.

The same general types of reactions are shown in Plates 12 and 13, which are the first four lines of the records of Subject 104. Reference to Table IX will show that this subject met the situation chiefly by changing the number of fixations per line.

Plates 14 and 15 are the first four lines of the records of Subject 94. They are reproduced here because an examination of them shows why the second record is not more labored than the first. This pupil, like many another in the schools, does not exhibit any ability to comply with the direction to read a passage rapidly. All reading for such a pupil is a form of study. Consequently, the second record shows no marked change from the first.

Finally, as a last example of this series, Plates 16 and 17 exhibit the first four lines of the records of Subject 102. He is a good reader, but evidently little affected by the exhortation to study the passage carefully. Practical teachers will have no difficulty in recalling students of this type.

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE 10.—Silent-reading record of Subject 198. Rapid, superficial reading

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE II.—Silent-reading record of Subject 198. Slow, careful reading preparatory to answering questions.

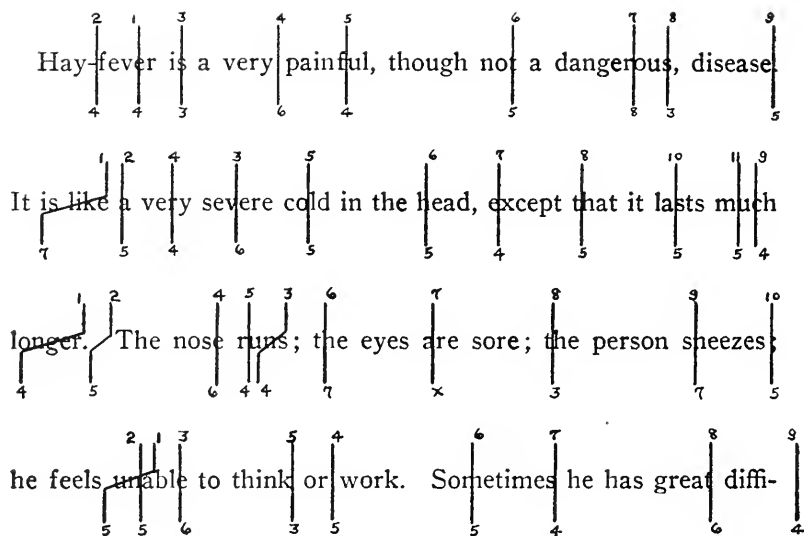


PLATE 12.—Silent-reading record of Subject 104. Rapid, superficial reading

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE 13.—Silent-reading record of Subject 104. Slow, careful reading preparatory to answering questions.

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much longer. The nose runs; the eyes are sore; the person sneezes; he feels unable to think or work. Sometimes he has great diffi-

PLATE 14.—Silent-reading record of Subject 94. Deliberate reading in spite of direction to read rapidly.

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE 15.—Silent-reading record of Subject 94. Slow, careful reading preparatory to answering questions.

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE 16.—Silent-reading record of Subject 102. Rapid, superficial reading

Hay-fever is a very painful, though not a dangerous, disease.

It is like a very severe cold in the head, except that it lasts much

longer. The nose runs; the eyes are sore; the person sneezes;

he feels unable to think or work. Sometimes he has great diffi-

PLATE 17.—Silent-reading record of Subject 102. Relatively little effect of direction to prepare for the answering of questions.

The general conclusion justified by an examination of the records of these twenty people is that the effect on the reading process of a call to read carefully is very different in different individuals. In some cases the effect is to narrow attention to a very limited range of words; in other cases the effect is to make the time devoted to the interpretation of certain impressions very long or quite irregular. The more common effect is the narrowing of attention.

The practical lesson for the teacher is that no class can be controlled, as a class, by the demand that a passage be read carefully. There will be some members of the class who will make no special response because they are always in the study attitude. There will be others who will not respond because they are persistently in the attitude of casual reading. Instruction in the different cases will have to be skilfully adapted to individual possibilities and tendencies. In general, instruction must recognize reduction of the scope of attention as the result most likely to follow the demand for increased care in reading.

In order to test the difference between rapid reading and careful study with reading matter which from the first requires careful attention, four high-school students and two college students were asked to read passages taken from a textbook on algebra. Their first task was to read silently a passage "as you would ordinarily read such material." The second task was to read silently the same passage "very slowly, trying to get the full meaning of the passage." The third task was to "study" a new passage closely resembling in difficulty the first passage.

It is hardly to be expected that contrasts as sharp as those which appeared in the reading of the selection from Thorndike's Alpha Reading Test will be exhibited when algebra is the subject prescribed in the passages. In the first reading algebra will show signs of being difficult material. The results, given in Table X, confirm this expectation and show in general much the same facts as those shown in earlier tables.

The only case in this series which stands out as altogether exceptional is that of Subject 206. Plates 18, 19, and 20 show the character of her three readings. It is evident in Plate 19, which should have shown careful, slow reading, that the subject skipped all of the difficult matter. In the second chapter an example of much the same type was found in fifth-grade reading. Probably there is a great deal of evasion of reading matter in the schools.

A case of this kind should not be dismissed lightly on the assumption that the student has wilfully omitted parts of the passage which he knew he ought to read in detail. The fact is that students very often do not

know what they are doing when they read. They encounter certain types of material and read them according to the impulse of the moment. The impulse of the moment is often wholly inadequate, but it fills the student's mental world. He has nothing else in mind with which to compare what he is doing and, consequently, cannot be critical of his performance.

Terry¹ has shown that the reading of an example in arithmetic differs from the reading of an ordinary prose passage in that the numbers in the arithmetic example are often overlooked during the first reading. The reader is absorbed in the directions which the problem gives him about the way in which the numbers are to be used. In such a case the reader usually comes back in a second reading to a careful recognition of the numbers. Something of this kind may have happened with Subject 206. In the second reading her attention was for some reason turned wholly away from the formula in the passage which she was supposed to read carefully. Even the phrases of the verbal part of the text were read either superficially or with the aid of the training secured during the first reading. Unfortunately, it is impossible to speak with certainty in this matter because the discovery that the formula had been skipped and that the general character of the reading was unusually rapid was not made until long after the record was taken.

It would probably have been futile to have asked the student what she did with the passage. Introspection is not easy when one is carrying on any piece of mental work. It would certainly have been wholly unproductive from an educational point of view to have dismissed the case as simply a pedagogical anomaly. The fact is that, for better or for worse, what Subject 206 did when she was told to read carefully was something wholly different from that which she did immediately before and immediately after. Whether this was due to distraction, to lack of knowledge as to methods of study, to wilful neglect, or to total ignorance of the meaning of the demand is not shown by the record. Whichever of these explanations is correct, the duty of the teacher is not to drop the case, but to deal with it. The teacher must find out whether the careful reading is effective. If it is not, the teacher must adopt methods, either of instruction or of discipline, which will bring about a change. When that change in the pupil's attitude is secured, there will be, as we know

¹ Paul Washington Terry, *How Numerals Are Read: An Experimental Study of the Reading of Isolated Numerals and Numerals in Arithmetic Problems*, Supplementary Educational Monographs, No. 18. Chicago: Department of Education, University of Chicago, 1922.

Such algebraic expressions as x^2 , a^2 , m^2 , $2mn$, etc., which
 may be represented by areas of geometric figures, are *second*
degree expressions. In a second degree expression, at least one
 term must have two literal factors. If these two factors are

PLATE 18.—Silent-reading record of Subject 206. Reading of algebra passage without special care.

Such algebraic expressions as x^2 , $a^2 - 1$, $m^2 - 2mn$, etc., which

may be represented by areas of geometric figures, are *second*

degree expressions. In a second degree expression, at least one

term must have two literal factors. If these two factors are

PLATE 19.—Silent-reading record of Subject 206. Reading of algebra passage with instructions to study carefully.

Such algebraic expressions as x^3 , a^2b , abc , a^3-1 etc., which
 may be represented by the volumes of geometric figures are *third*
degree expressions. Third degree expressions are sometimes
 called *cubic expressions*.

PLATE 20.—Silent-reading record of Subject 206. Reading of new algebra passage with instructions to study carefully.

from our earlier analyses, an appropriate form of behavior and an appropriate psychological pattern.

The rest of the results reported in Table X require no special comment, because they follow the general lines of statistics reported in earlier tables and fully discussed in earlier paragraphs.

The method of inducing a change in the attitude of readers in the two experiments thus far described in this chapter was the method of telling the reader to assume a certain attitude. There is another less direct way of producing a change. The reader can be led into a certain attitude without being appealed to in explicit terms. The third section of this chapter will deal with such a case.

Six high-school students were asked to read silently an easy prose passage and were given no instructions whatsoever about the special

TABLE X
COMPARISON OF VARIOUS READINGS OF ALGEBRA PASSAGES

SUBJECT	AVERAGE NUMBER OF FIXATIONS PER LINE			AVERAGE DURATION OF FIXATION PAUSES			AVERAGE NUMBER OF REGRESSIVE MOVEMENTS PER LINE		
	First Reading	Second Reading	Study of New Passage	First Reading	Second Reading	Study of New Passage	First Reading	Second Reading	Study of New Passage
204.....	7.3	8.8	8.8	5.6	5.7	5.7	0.4	0.8	0.6
205.....	10.9	11.5	11.9	8.5	9.2	9.2	1.1	1.3	1.8
201.....	12.8	15.3	15.0	7.0	7.4	7.4	3.0	4.3	3.8
200.....	7.5	8.1	9.6	7.1	7.4	7.4	0.9	1.6	2.5
199.....	10.8	15.6	10.0	6.1	6.0	6.0	2.1	4.8	5.5
206.....	10.0	5.8	9.6	6.2	6.2	6.2	3.0	1.1	3.0

direction of attention while reading. Immediately after this they were given a passage to be read aloud. At the close of the reading of the second passage the experimenter asked some questions about what had been read. The questions had not been expected by the students and, of course, had no effect on the attitude exhibited during the reading of the passage to which they related. They aroused the students at once, however, to a state of expectancy and, when they were asked to read a third passage silently, they read in much the same way as they would have done if they had been explicitly told that they were going to be asked questions.

For the purposes of our present study we may ignore the statistics regarding the oral reading. It has been shown in earlier studies that the number of fixations and the duration of fixation pauses in oral reading are wholly different from those in silent reading. Such was the case in this experiment also and, therefore, the figures are omitted.

Table XI presents the results for the first and third passages of the experiment. The facts brought out by this table are of a type similar to those repeatedly shown in earlier tables. Subject A19, for example, prepares to answer questions by lengthening very materially the period of each fixation. In this case the average number of fixations per line is somewhat reduced. Subject A27 adopts an entirely different attitude, increasing greatly the number of fixations per line. Subject A35 does not seem to be seriously affected by the oncoming demand for questions.

Table XI suggests a great many practical questions. Under our system of teaching, a large part of the pupil's reading is done under the stimulus of an explicit statement from the teacher that questions are going to be asked, or at least under the stimulus of a lively expectation of questions.

TABLE XI

RECORDS OF HIGH-SCHOOL STUDENTS UNDER VARYING CONDITIONS OF EXPECTANCY OF QUESTIONS

SUBJECT	NO EXPECTATION OF QUESTIONS		EXPECTATION OF QUESTIONS	
	Average Number of Fixations per Line	Average Duration of Fixation Pauses	Average Number of Fixations per Line	Average Duration of Fixation Pauses
A31.....	6.6	5.4	7.5	6.6
A19.....	8.0	4.1	7.6	5.9
A22.....	5.7	6.5	5.6	6.7
A35.....	7.8	5.4	7.6	5.1
A27.....	6.4	5.7	9.3	6.1
A28.....	7.1	5.9	8.7	6.0

What is the psychological effect of combining with the process of reading this forward look toward questions?

It is safe to say that in the minds of most students the expectation of questions does not lead to any well-ordered plan of attack on the content of the passage read. There is probably little more than a vague feeling of anxiety, a kind of restless distraction arising from the idea of tomorrow's recitation and its dangers.

Even when students are fully aware of the necessity of preparing for questions, they usually do not know what to do. They have never been trained to ask themselves intelligent questions. This is proved by the fact that when an ordinary high-school class is invited to ask questions on the lesson they sit dumb and ashamed. Their past training in the matter of questions is that the teacher draws out of the depths of his own pedagogical preparation those queries which no student seems to be pre-

pared to meet. How one formulates a question, or how one gets ready to meet questions, usually remains a bewildering mystery, so far as the student is concerned.

The student, thus untrained for his task, may, and often does, try to fix his mind on everything. Sometimes he divides the reading matter into smaller bits than usual, looks at each word, and tries to get the passage sufficiently stamped on his mind so that when the demand comes he may produce the required words. At other times, instead of taking up the passage in bits, the student looks a little longer at each word. In some cases, no doubt, this longer looking is accompanied by an inner articulation of the word in the effort to memorize it for the recitation.

If the school is going to hold over the student the expectation of questions, ought it not to train him in methods of meeting its demands? Ought not the teacher to tell the class how questions are made up and then discuss the matter somewhat as follows? "In preparing for the next recitation you can anticipate practically everything I am going to ask if you will think about the purpose of the passages in the text. You need not try to learn the text word for word. You need not say the sentences to yourselves. Indeed, if you will read the material through rapidly and think about it and then read it over again rapidly, you will make a double gain, because you will cultivate habits of fluent reading and will, at the same time, gain time for thoughtful consideration of the matter under discussion."

When one sees the utterly unstandardized results exhibited in such tables as have been reported thus far in this monograph, one cannot escape the conviction that pupils have been left to work out their own devices of meeting the demands imposed on them in preparing their lessons through reading. One cannot escape also the conviction that there is a deplorable conflict between reading and study rather than a wholesome adjustment of reading to the complex demands which come in the higher forms of reading. There is a striking slowing-down of reading with every demand that savors at all of careful reading. It is only the passage of fiction and the easy narrative read without directions which seem to go forward with reasonable expedition. The serious forms of reading require from seven to ten fixations per line. This number of fixations indicates, beyond question, clumsy or at least laborious reading. When one considers the number of fixations that would be saved in an hour of reading if the average could be reduced even by so little as one-half a fixation per line, and when one recalls that reduction of the number of fixations is the most common effect of increased training, one can

hardly refrain from criticizing severely the schools which neglect to give lessons in silent reading.

One of the authors of this monograph has shown in an earlier work¹ the present averages of achievement in school reading. It is not out of place to follow that discussion with an urgent plea for improved methods that will reduce the averages. The present study has shown that not even the averages are maintained when careful reading rather than mere reading is demanded. There is double reason, therefore, for the plea that careful reading be made more fluent through systematic training.

¹ Guy Thomas Buswell, *Fundamental Reading Habits: A Study of Their Development*, Supplementary Educational Monographs, No. 21. Chicago: Department of Education, University of Chicago, 1922.

CHAPTER IV

ANALYTICAL STUDY AS DISTINGUISHED FROM READING

This chapter presents a series of facts which show that there are many kinds of mental processes which may be aroused in the presence of a printed page that ought not to be classified as reading. Thus, it will be shown that when a student is asked to pay attention to grammatical facts he is no longer left free to read. He is set a task of analytical study so engrossing that his mental attitude and his whole performance must be recognized as something other than mere reading. In a somewhat less striking degree the student who is asked to give attention to the vocabulary of a passage turns away from the subject-matter and, in so far as he does this, gives up reading.

The cases discussed in the following pages differ from those described in earlier chapters. In the second chapter the character of the subject-matter was varied. There was, however, no demand made on the reader except the demand that he understand the meaning of each passage. To be sure, some passages required more concentration and effort, but the mental process involved was strictly a reading process. In like fashion, the cases discussed in the last chapter, although they exhibited certain changes in the reader's attitude, never got away from the primary purpose of extracting meaning from the passages. Direct attention to subject-matter is characteristic of all of the cases discussed thus far.

The type of complication to which we now turn is illustrated in its most rudimentary form by oral reading. A person who is reading out loud is not attending wholly to the subject-matter of the passage. He is carrying on, at the same time that he is trying to extract meaning from the printed page, a complicated motor process which requires some conscious supervision. If the demand for clear enunciation becomes a little more exacting than usual, there may be so much withdrawal of attention from the subject-matter of the passage that the reader will be thrown into an attitude of mind which is only secondarily the attitude of understanding the meaning.

Another example of departure from the direct reading process can be drawn from a study of proofreading. Close attention to certain formal characteristics of printed matter may become so much a matter of major interest that the critic of proof will get none of the content of the sentences which he scans.

The high school avoids most of the distractions which arise from oral reading and proofreading but often puts the greatest emphasis on matters of vocabulary and rhetorical form. In some cases the emphasis on rhetorical form is of a type which may be described as unintentional. The student is given a textbook which is written with long, abstract sentences which are so far beyond his grasp and the scope of his attention that he falls back to a consideration of mere words. Sometimes passages contain so many new and unfamiliar words that the student never gets beyond the most formal consideration of these words. It is, of course, utterly out of accord with the facts to say of a student under such conditions that he reads his lessons. He must be described rather as stumbling through a mass of words. It does not correct the situation at all that the author of the textbook and the teacher can read the assignment. Both author and teacher may have intended that the student should read, but the fact remains that the mental processes induced in the presence of many a textbook assignment are not those of reading.

In addition to the unintentional distractions put in the way of a high-school student's reading, there are other distractions which come with the fullest sanction of the teacher. The high school prides itself on being the home of rhetoric. The niceties of expression, the choice of the most suitable words, the fundamentals of grammatical structure are very often put before meaning in the study of English classics and in the translation of foreign languages. A very large fraction of every high-school student's waking hours is devoted to highly analytical literary studies which sidetrack him from reading.

What has been said is not intended at all to be a general denial that analytical studies may be, and often are, useful. The purpose of the discussion is to bring out with all clearness a distinction. As was pointed out in the introductory chapter, where a clear-cut distinction can be established between certain classes of mental activities, the practical methods of the school will have to be adapted to these distinctions. Therefore, when a distinction exists between rhetoric and reading, it is highly important for practical school purposes that this distinction be fully understood. Then, if it is decided for any reason to cultivate rhetoric, the methods of teaching can be properly directed toward this end. If, on the other hand, it is decided in some other case that content is the chief concern, then the method adopted should reflect this choice.

The concrete cases which were worked out in this study do not by any means exhaust the possibilities. It is hoped that the examples chosen will be regarded as mere sample cases and that the distinctions which they

establish will be carried much further by those who have to devise methods of meeting the problems of high-school teaching.

The experimental procedure in this part of the investigation was to secure a series of narrative passages, all made up of simple words and short sentences and all making about the same demands on the reader's training. The material finally chosen was taken from the introductory paragraphs of the story of Aladdin in the *Arabian Nights*. Each reading exercise was composed of from seven to nine lines, and the successive passages carried forward the narrative so that the reader had all of the advantages which could be derived from continuity.

Before the photographs of a given reader's eye-movements were taken, he was introduced to the general style of the passages which were to be used by being asked to read a page from a section of the story later than that from which the experimental material was taken. When the preparatory reading was finished, the subject was asked to read out loud a first passage. He was given no special directions but was allowed to adopt his own natural rate and attitude of oral reading.

The first passage was as follows:

Once upon a time a tailor, by the name of Mustapha, lived in one of the wealthy cities of China. He was so poor that he could hardly support himself and his family, which consisted of a wife and son. His son, who was called Aladdin, was a good-for-nothing, and caused his father much trouble, for he used to go out early in the morning, and stay out all day, playing in the streets with idle children of his own age.

At the close of the reading the subject was asked two questions: "In what country is the scene of this story laid?" and "How many members were there in the family about whom the story is told?" The purpose of the questions was to influence the later reading. As was shown in Chapter III, the attitude of preparing to answer questions is one which results in an increase in the number of fixations and in the average duration of fixation pauses. It was deemed wise to raise all of the subsequent performances in this section of the investigation to this level of increased number of fixations. The reading to be reported in this chapter involves, accordingly, first, the effort to be ready to answer questions and, in addition, the other types of effort which are the special subjects of investigation and are to be classified as forms of analytical study.

The next step, after securing a record of the oral reading of the first passage and arousing the expectation of questions, was to ask the subject to read a passage silently. Again, no special directions were given. The subject was, however, induced, by the questions asked after the first passage, to read slowly and carefully.

The second passage was as follows:

When Aladdin was old enough to learn a trade, his father took him into his own shop, and taught him how to use his needle, but to no purpose; for as soon as his father's back was turned, Aladdin was gone for that day. Mustapha punished him. But Aladdin did not improve, and his father was so much troubled that he became ill, and died in a few months.

At the conclusion of the reading the subject was asked, "What kind of a boy was Aladdin?" and "What did Aladdin's father do to him?"

The subject was by this time well in the spirit of the narrative and was well established in the attitude of answering questions. The third passage continued the narrative, as follows:

Aladdin, no longer under fear of his father, gave himself entirely over to his idle habits, and was always on the streets. This course he followed till he was fifteen years old, without giving his mind to any useful pursuit. As he was one day playing in the street, with his vagabond associates, a stranger passing by stood and watched him closely. The stranger was an African magician, and had been but two days in the city.

Before this passage was presented, special directions were given in the following words: "The next passage is to be read silently. When you are through, please try to recall enough of the words and phrases to tell me three words which are not altogether common in everyday conversation."

The purpose of these directions was to turn the reader's attention to the vocabulary of the story. It was not intended to introduce a distraction serious enough to withdraw attention altogether from the narrative, and the reader was not told anything about the purpose of the experiment. It is believed that all of the conditions were enough like those of the ordinary school experiences of the pupils so that they thought of the directions given them as similar to the ordinary directions given in the English class.

At the conclusion of the third reading the subject was asked the single question, "How old does this passage say Aladdin was?"

The fourth passage was as follows:

The African magician, seeing that Aladdin was a boy well suited for his purpose, made inquiries about him; and, after he had learned his history, called him aside, and asked him about his father. Aladdin told him about his father and in the end told him also that his father was long since dead. At these words, the African magician threw his arms about Aladdin's neck and kissing him with tears in his eyes said, "I am your uncle."

The directions were: "Please read the next paragraph out loud and pay particular attention to correct pronunciation and good emphasis." The purpose here was to center attention on the sound characteristics of the passage and thus to secure in some measure the oral counterpart of the emphasis on novel and unfamiliar words which was sought in the preceding stage of the experiment.

The question at the conclusion of this reading was: "What did the magician ask Aladdin?"

The fifth passage was as follows:

Then he gave Aladdin a handful of small coins and told him to go to his mother and tell her that he would visit her tomorrow. Again, the next day, Aladdin's uncle found him playing in another part of town, and embracing him as before, put two pieces of gold into his hand, and said to him: "Carry this, child, to your mother, tell her that I will come and see her tonight, and bid her get us something for supper; but first show me the house where you live."

The directions were: "Read the next passage to yourself and, when you have finished, dictate to the phonograph everything you can remember." At the conclusion of this reading no questions were asked because the dictation supplied evidence of careful reading.

The purpose of this fifth reading was twofold. It served, together with the questions that had been asked, to keep the reader constantly alert to the meaning of the passage. This was regarded as essential to the experiment throughout. As stated in an earlier paragraph, the level of the whole performance was raised high enough so that no errors of interpretation of results could arise from effects due to careful, slow read-

ing. The second purpose of this very simple direction in the middle of the series was to see whether explicit reference to content would bring out any sharp contrasts with the preceding and subsequent records. It is to be supposed that up to this point the reader was able to give much attention to content in spite of the distractions, but he had not been explicitly told to emphasize content. This passage gives a basis of assurance that we know the extreme effect of emphasis on content.

The next exercise was introduced by directions and a demonstration. The subject was asked to paraphrase the passage shown him. He was told to dictate his paraphrasing to the phonograph. In order that he might know what was wanted, he was shown the first line of the paragraph and, below it, a sample of the kind of paraphrasing that he was asked to make. The demonstration lines were as follows:

Aladdin showed the magician the house.

The boy pointed out to his supposed uncle where he lived.

After the experimenter felt sure that the requirements were understood, the full passage was exposed, as follows:

Aladdin showed the magician the house, and carried the two pieces of gold to his mother, and when he had told of his uncle's intention, she went out and bought food, and borrowed dishes from her neighbors. She spent the whole day in preparing the supper; and at night, when it was ready, said to her son: "Perhaps your uncle will not find the way to our house; go and bring him with you if you meet him."

It may be said, in anticipation of the final results, that paraphrasing, turned out to be a most formidable task. Evidently the pupils—all of whom were studying a foreign language and had more or less facility in translation—had no training of a kind to prepare them for this task.

Following the paraphrasing, a grammatical problem was presented. The passage to be read was printed in the usual type, except that certain verbs were printed in bold-face type. The passage was as follows:

Aladdin was ready to **start**, when the magician came in **loaded** with wine, and all sorts of fruits for dessert. After the African magician had **given** what he brought into Aladdin's hands, he saluted his mother, and desired her to **show** him the place where his brother Mustapha used to sit on the sofa; and when she had so **done**, he **bowed** his head down, and kissed it.

Before the passage to be read was exposed, the student was told that some of the verbs would be printed in heavy type. He was asked to read the passage to himself and to pick out the verbs which had objects; these he was to pronounce into the phonograph.

The series of readings reported in this chapter closed with a passage which the subject was asked to read carefully to himself and to repeat word for word to the phonograph. The passage was as follows:

Then the magician sat down and began to talk with Aladdin's mother: "My good sister," said he, "do not be surprised that you have never seen me during all the time you have been married to my brother Mustapha. I have been forty years absent from this country; and during that time have traveled in many lands until finally I settled in Africa."

The purpose of these directions was to check once more the complete understanding of what was read and to secure a record of the effect of a demand for word-for-word reproduction as contrasted with the earlier, vaguer demand, "report everything you can remember."

Complete and usable series of records were secured from five subjects. These were students from three high schools. Four were rated as superior, one as weak. They were from the Junior and Senior years of the high school and in one case, A28,¹ from the first year of a junior college connected with a high school. Their records in reading and their school records show them to be a typical superior high-school group.

The findings reported in earlier chapters justify the belief that general averages will be of less value in the study of such complex forms of reading as are here under discussion than will be the careful comparison of the records of a single individual. We turn, therefore, to a consideration of the individual tables.

In the performances of Subject A23 it is noticeable that all of the simpler forms of reading, that is, the types of reading numbered 1, 2, 5, and 8, in Table XII, show average durations of fixation pauses which hold fairly close to the minimum commonly found.

The adjustments for these simpler forms of reading are made almost exclusively in the number of fixations per line. This means that Subject A23, when confronted with any simple task, is able to recognize each unit

¹The subjects whose records are used in this chapter and the next are distinguished from those whose records are discussed elsewhere by the use of the letter A in connection with a serial designating number.

to which she gives attention in a period of time which proves that she is highly trained in word-recognition. If the situation grows at all complex, she tends to cut down the unit which she tries to grasp.

There is a close resemblance, too, among the various simpler readings in respect to the number of fixations per line. The most radical departure from this rule is in the number of fixations for the first oral passage. The large number of fixations here is impressive because it exceeds the number of words per line. The large number of fixations in this first record may be due to the fact that the reader was getting started and had not yet become immersed in the narrative.

In the cases where special directions were of such a character as to draw the attention of the subject in some measure away from the content

TABLE XII
RECORD OF SUBJECT A₂₃ IN VARIOUS TYPES OF READING
AND ANALYSIS

Types of Reading and Analysis	Average Number of Fixations per Line	Average Duration of Fixation Pauses
1. Simple oral.	14.1	5.4
2. Silent—questions.	11.8	5.0
3. Peculiar words.	12.8	6.3
4. Emphatic oral.	12.0	6.8
5. Silent—dictate ideas.	11.4	5.2
6. Paraphrase.	48.0	9.0
7. Verbs.	12.2	6.0
8. Silent—verbatim.	12.0	5.3

of the reading matter, namely, in the passages where attention was called to peculiar words, emphasis on enunciation, paraphrasing, and verbs, the duration of fixation pauses was such as to prove that some mental process was going on which was other than simple reading. Consciousness is dwelling on each unit of experience, seeking some content additional to that presented to the eyes.

Paraphrasing is unique in all respects. In almost every instance Subject A₂₃ makes long fixation pauses. Some of the pauses are long enough to justify the inference that the subject is quite lost in her efforts to get phrases and, consequently, fixates a point without attention to the word fixated while searching around in consciousness for some synonym for the phrase already recognized. In addition to the abnormal length of fixation pauses, the paraphrasing example shows a number of fixations so extravagant as to prove that the subject's problem was by no means

one of recognition. The excessive number of pauses represents a wandering of the eye around the page while consciousness attempted the discovery of words to fill the demand. This wandering of the eyes must have brought to the subject a bewildering mass of visual experiences which complicated enormously the processes of thought.

Since the conventional method of exhibiting eye-movements does not seem adequate in depicting the successive stages of behavior while a pupil is paraphrasing, a new type of representation is presented. Plate 21¹ shows the record of fixations for a single line of paraphrasing in the form used in earlier portions of this monograph. Plate 22 is the new form of representation and gives at successive levels a statement of what was immediately in the eye of the observer at the various fixation pauses. It is not possible to determine exactly what was in the reader's eye, because we do not know definitely the range of clear vision. It is in keeping with the general evidence which has been accumulated in regard to the range of vision to assume that a subject sees clearly five or six isolated letters and possibly twice this number when the letters form familiar words. It is quite certain that in many cases the subject does not fully take in so large a number of letters. We may, however, for the sake of not underestimating the content of vision, assume that the subject sees ten letters at each fixation. The space between two words may be counted as equivalent to a letter. Furthermore, it will be observed if one introspects his experiences in looking at a line of printed matter, that one sees more clearly the letters at the right of the center of fixation than the letters at the left. This plate and subsequent similar plates are accordingly made up in such a way as to include for each fixation four letters to the left and six to the right of the point of fixation. The successive stages of visual apprehension of the line are represented by dropping the record to a new level with each movement of the eye forward or backward. The vertical distance between two successive levels representing successive fixations is made proportional to the time during which the eye remains at a single fixation. Typewritten letters, instead of printed letters, are used in making up the plates for motives of economy, and the whole record is much reduced in scale so as to crowd it on a single page.

Plate 23 shows, for purposes of comparison, the visual impressions received during the reading of two typical lines of the second passage by Subject A23 while reading silently according to her own devices. The only complication here was that she expected questions.

¹ The dotted lines at pauses Nos. 29 and 30 indicate that the eye left the line altogether and fixated points above.

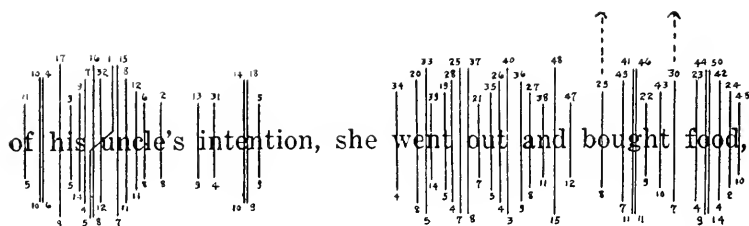


PLATE 21.—Record of the eye-movements of Subject A23 while attempting to paraphrase a line.

of his uncle's intention, she went out and bought food.

his uncle's
 uncle's int
 f his uncl
 of his uncl
 ntenion,
 uncle's i
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PLATE 22.—The same record as in Plate 21, arranged so as to show visual content of successive fixations.

It is more evident from the observation of these records than from the tables that paraphrasing cannot properly be called a form of reading. Reading is undoubtedly involved. The subject must get the ideas from the printed page. It sometimes looks, for short intervals, as though the subject were reading in a normal fashion and then, having covered a short sentence, she drops back into aimless wandering of the eyes while she seeks in her thoughts for phrases which she can use to express the idea gained in the momentary reading. Such an episode appears when she reads the words "she went out and bought food" as shown in fixations 20 to 24 in Plate 21.

The chief point to be made is that the process of paraphrasing, taken as a whole, is not a form of reading.

Guided by the clue secured in dealing with paraphrasing, we may turn to some of the other complex processes. Plate 24 shows what Subject A23 does in looking for transitive verbs. There is here a perfect picture of analytical movement. The eye moves forward and gives opportunity for the subject to take in a few words and then turns back while the subject rescutinizes the words for purposes of seeing whether they are of the type to be selected. This analytical movement is conspicuous in the immediate neighborhood of a verb where, of course, the problem of selection is crucial.

Again, it is evident, though perhaps less impressively so than in the case of paraphrasing, that the subject is not reading. She is making an analysis of the reading matter. This analysis is predetermined in character by the purpose of selecting transitive verbs, and the movement of the eyes accordingly takes on a special character at the point where the observation of verbs is made.

The practical lessons which issue from this study of grammatical analysis and its nature are of profound significance for the school. If one asks about the directions which teachers give the pupils in most of the exercises of the school for the purpose of controlling their reading, one finds that a very large fraction of the reading is, in fact, looking for something on the printed page. Looking for something is doubtless very different in different cases, but it is always more or less of an analytical matter and, just in so far as the mental process becomes analytical, it departs from the typical behavior of reading.

It is altogether probable that the constant emphasis of the schools on analytical reading may set up a general tendency in the mind of the pupil to feel that he is not doing his duty by a book unless he is perusing it slowly and laboriously and in a fashion which aims to find something

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 to use his needle, but to no purpose; for as soon as his
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² | ¹ | ³ | ⁵ | ⁴ | ⁶ | ⁷ | ⁸ | ⁹ |
 father took him into his own shop, and taught him how
₃ | ₄ | ₆ | ₆ | ₃ | ₇ | ₄ | ₈ | ₅ |

² | ¹ | ³ | ⁵ | ⁴ | ⁶ | ⁷ | ⁸ | ⁹ |
 to use his needle, but to no purpose; for as soon as his
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PLATE 23.—Two typical lines from the record of Subject A23 reading silently without analysis.

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in the passage other than the straightforward meaning. Most schools assign lessons of such brevity as to make it clear that pupils are not expected to do much reading. The time is then occupied in class in searching every nook and corner of the line for curious rhetorical or historical intricacies. In the meantime, the valuable habit of reading in a straightforward fashion suffers by disuse and by a series of involved distractions which bring into the reader's experience almost every other possible form of thinking.

Returning from these suggestions as to the practical significance of the study of analytical forms of reading, we may take up a scrutiny of another record taken from Subject A23. Plate 25 shows the way in which the third passage was read by this subject when she was told to look for peculiar words. There is in most of the lines less of the moving backward and forward than there was in the records of paraphrasing and grammatical analysis, but there are clear traces of analysis even here. Especially striking are the evidences of analysis in the lines beginning "As he was" and "closely." Plate 26 exhibits in detail the line beginning "closely."

Plate 27 continues the search for traces of analysis by presenting a part of the record made when Subject A23 was directed to attend to the clear enunciation of the words and phrases. This plate does not represent adequately all of the facts which come out when the photographic record is examined. Laboratory experience with photographs of eye-movements makes it possible for the experimenter to determine by inspection when he is dealing with any form of oral reading as distinguished from any form of silent reading. Oral reading is always accompanied by head-movements which complicate the record. The head of the reader is held by various clamps and braces in as nearly a fixed position as possible, but as soon as the reader begins to articulate the braces prove incapable of holding the head, because the whole muscular system is brought into sympathetic action.

The general nervous commotion which accompanies oral reading of every kind is exaggerated when the reading is unusually exacting. Such was the case when the subjects were told to give special attention to pronunciation and enunciation.

It may be remarked in passing that head-movements appear also under conditions of difficult silent reading. As soon as a subject finds it difficult to understand a passage for any reason, there appear general signs of muscular agitation, and these are recorded in the photograph as head-movements.

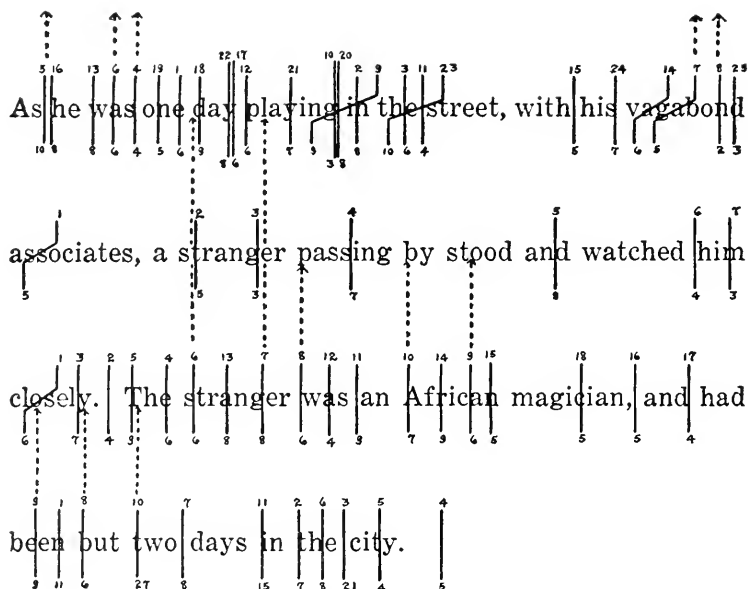


PLATE 25.—Record of Subject A23 reading silently and analyzing the passage for peculiar words.

¹ | ³ | ² | ⁵ | ⁴ | ⁶ | ¹³ | ⁷ | ⁸ | ¹² | ¹¹ | ¹⁰ | ¹⁴ | ⁸ | ¹⁵ | ¹⁸ | ¹⁶ | ¹⁷
 closely. The stranger was an African magician, and had
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PLATE 26.—Rearrangement of the record of the third line shown in Plate 25

The African magician, seeing that Aladdin was a boy
 well suited for his purpose, made inquiries about him;
 and, after he had learned his history, called him aside,
 and asked him about his father. Aladdin told him about

PLATE 27.—Record of Subject A23 reading orally and attending to clear enunciation.

The record shown in Plate 27 exhibits not only the head-movements that indicate general agitation and the numerous fixations which are characteristic of oral reading, but also some traces of the backward and forward movements which are characteristic of the analytical attitude.

We are now in a position to describe the type of behavior which is present when the subject is attempting an analysis of the printed page. The gross fact is that analytical study of a page is slower than ordinary reading. The slower reading is due in part to the fact that there are more fixations per line than would have been required even for attentive reading. Furthermore, these frequent movements lack the simple progressive direction which is characteristic of fluent reading. There are many regressive movements, and the regression often exhibits several steps. Sometimes the eye moves back two or three steps or moves back and forth across the same point in several movements. The pauses at each fixation are also increased in length above the minimum of expert recognition. The longer fixation pauses evidently mean a mental effort on the part of the subject to call up experiences that will illuminate in some additional way the passage being read.

There is doubtless some analysis of a simple type present in all immature reading. It is a striking fact that regressive movements are very common with immature readers. Long fixation pauses are also characteristic of immaturity. When these analytical symptoms appear in the reading of little children we usually tolerate them, because we consider the process of learning to read as a succession of efforts, some of which will not succeed because they are misdirected. When, accordingly, a child stops and makes a backward movement, we think of it as an exceptional effort to overcome a difficulty. We think of the reading process as in the making. When, on the other hand, a mature reader is drawn back into these undesirable forms of behavior while he is trying to read, we cannot accept the irregularities with complacency because they show a disintegrating tendency.

There are, indeed, conditions under which we can think of even a mature reader as making an effort to acquire fluent successful reading through a period of analytical, cumbersome activities, as, for example, when he encounters a detailed series of symbols in an algebraic formula or a passage full of new and strange words. But in such cases the mature reader shows his maturity by avoiding, for the most part, backward and forward movements, or by deliberately adopting some device other than reading to extricate himself from the difficulty. For example, when such a reader encounters a new word, instead of hovering helplessly around it, he resorts to a dictionary.

Such a consideration of the contrasts between different types of reading leads directly to numerous pedagogical maxims. First, teachers ought to know in every case what they are teaching. Thus, the teacher of literature ought to know whether she wants her students to read belles-lettres or to make analyses of the text with the aid of references to the classical dictionary. Second, teachers should know what method of training to adopt if they want pupils to cultivate certain classes of habits. For example, it is folly to expect the type of reading which leads to literary appreciation during an elocutionary exercise in which the chief channels of nervous excitement lead to the vocal cords. Third, teachers should understand that reading habits set up under conditions which constantly and repeatedly demand elaborate grammatical analyses are not likely to be productive of fluent, progressive reading.

From the foregoing sketch of the reading habits of Subject A₂₃ and the general discussion of inferences based on this subject's records, we turn to the consideration of the records of the other four subjects included in this series. These records confirm fully the contrast which has been drawn between reading and analysis. It will be well, however, to reproduce a number of typical lines from the various records so that the reader of this monograph may form his own judgments. Comparison of the records of all of the subjects brings out also the sharp contrasts between individuals.

Perhaps the simplest way of presenting the material is to give the full tables and to comment on a few of the outstanding conclusions which can be based on them and then to consider a number of detailed records. Tables XIII–XVI are similar in form to Table XII.

Among the special points of interest in the records of Subject A₂₇, exhibited in Table XIII, are the marked increases in the number of fixations in all of the analytical processes. Looking for peculiar words seems to be for this subject a painstaking analysis of each line. Plate 28 shows a sample line. Grammatical analysis also seems to be for this subject a most distracting undertaking. Plate 29 gives an example.

In sharp contrast with the labored efforts in analytical processes this subject evidently experienced great relief when he came to the demand that he read for dictation of ideas. Evidently this impressed him as a type of exercise entirely familiar and directly comparable to the ordinary demands of the school. For him this type of reading is simpler than the slow, careful reading which he felt compelled to do in the second exercise when questions of unknown import threatened. Plate 30 gives a few lines of the record of silent reading of the type numbered 5 in Table XIII.

While reporting what he read was a familiar task taken up lightly by this subject, the business of preparing to repeat verbatim was a much more serious undertaking.

One characteristic of the records of analytical reading is that they are very irregular. Certain lines seem to be mastered without great effort.

TABLE XIII
RECORD OF SUBJECT A27 IN VARIOUS TYPES OF READING
AND ANALYSIS

Types of Reading and Analysis	Average Number of Fixations per Line	Average Duration of Fixation Pauses
1. Simple oral	9.3	7.6
2. Silent—questions	8.4	6.1
3. Peculiar words	14.9	6.6
4. Emphatic oral	11.7	6.8
5. Silent—dictate ideas	5.6	6.1
6. Paraphrase	29.2	8.5
7. Verbs	20.1	7.1
8. Silent—verbatim	10.1	7.7

The pauses are few in number and regular in forward progression. Other lines show the greatest complication. Plate 31 reproduces three successive lines in the verbatim record of Subject A27, two of which show a large number of irregular fixations.

TABLE XIV
RECORD OF SUBJECT A28 IN VARIOUS TYPES OF READING
AND ANALYSIS

Types of Reading and Analysis	Average Number of Fixations per Line	Average Duration of Fixation Pauses
1. Simple oral	9.2	6.5
2. Silent—questions	7.1	4.6
3. Peculiar words	8.2	7.4
4. Emphatic words	9.7	7.2
5. Silent—dictate ideas	7.0	5.1
6. Paraphrase	27.4	8.6
7. Verbs	11.4	7.0
8. Silent—verbatim	9.0	8.0

Subject A28, as may be seen in Table XIV, shows fluctuations in the duration of fixation pauses and marked fluctuations in the number of fixations per line. For example, the demand that he repeat word for word leads this subject to look long and deliberately at each word. Plate 32 shows a sample line.

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 $\begin{array}{c} 9 \\ | \\ \text{a} \\ | \\ 10 \end{array}$
 $\begin{array}{c} 10 \\ | \\ \text{s} \\ | \\ 10 \end{array}$
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PLATE 28.—A line from the record of Subject A27 reading silently and analyzing for peculiar words.

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 her to show him the place where his brother Mustapha
₅ | ₅ | ₉ | ₁₀ | ₈ | ₅ | ₄ | ₅ | ₅ | ₆ | ₃ | ₆ | ₇ | ₃ | ₆ | ₈ | ₈ | ₅

² | ⁴ | ³ | ⁵ | ⁷ | ¹⁰ | ⁸ | ¹² | ¹⁷ | ¹¹ | ¹⁸ | ¹³ | ¹⁶ | ¹⁴ | ¹⁹ | ¹⁵ | ²⁰
 her to show him the place where his brother Mustapha
₅ | ₅ | ₉ | ₁₀ | ₈ | ₅ | ₄ | ₅ | ₅ | ₆ | ₃ | ₆ | ₇ | ₃ | ₆ | ₈ | ₈ | ₅

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Then he gave Aladdin a handful of small coins and told
 him to go to his mother and tell her that he would visit
 her tomorrow. Again, the next day, Aladdin's uncle
 found him playing in another part of town, and embracing

PLATE 30.—Record of Subject A27 reading silently passage to be reproduced

you have been married to my brother Mustapha. I have
 been forty years absent from this country; and during
 that time have traveled in many lands until finally I

PLATE 31.—Record of Subject A27 reading silently in preparation for verbatim reproduction.

Silent reading to answer questions is a very direct and fully mastered procedure for this subject. A marked contrast appears when one compares the record for such silent reading with the record for grammatical analysis. The two records are shown in Plates 33 and 34.

Subject A28 made fewer fixations in paraphrasing than any of the subjects in this series. Two specimen lines are shown in Plate 35.

Subjects A29 and A31, whose records are shown in Tables XV and XVI, differ from each other in general ability. Subject A31 is reported

TABLE XV
RECORD OF SUBJECT A29 IN VARIOUS TYPES OF READING
AND ANALYSIS

Types of Reading and Analysis	Average Number of Fixations per Line	Average Duration of Fixation Pauses
1. Simple oral.	9.6	6.3
2. Silent—questions.	7.2	7.3
3. Peculiar words.	8.4	7.1
4. Emphatic oral.	8.1	7.4
5. Silent—dictate ideas.	6.8	6.0
6. Paraphrase.	31.4	9.2
7. Verbs.	13.2	8.2
8. Silent—verbatim.	8.6	7.1

TABLE XVI
RECORD OF SUBJECT A31 IN VARIOUS TYPES OF READING
AND ANALYSIS

Types of Reading and Analysis	Average Number of Fixations per Line	Average Duration of Fixation Pauses
1. Simple oral.	10.4	4.8
2. Silent—questions.	7.5	6.6
3. Peculiar words.	10.1	6.7
4. Emphatic oral.	12.1	6.6
5. Silent—dictate ideas.	9.1	6.4
6. Paraphrase.	63.7	9.0
7. Verbs.	17.8	7.7
8. Silent—verbatim.	10.1	8.3

as a weak student, while Subject A29 is reported as superior. This may be the explanation of the fact that throughout all of her records Subject A31 shows a very large average number of fixations per line, while Subject A29 shows a relatively small average number.

Subject A29 is especially disturbed by the demand for grammatical analysis. Plate 36 shows a part of his record. It is especially to be

^{1 10 9} that | ^{2 12 11} time | have | ³ traveled | in | ^{13 4} many | ^{6 14 5} lands | until | ¹⁵ finally | ^{7 16 8} I
_{6 11 5} _{7 5 10} ₃ _{5 8} _{5 12 4} ₆ _{5 9 3}

^{1 10 9} that | ^{2 12 11} time | have | ³ travelled | in | ^{13 4} many | ^{6 14 5} lands | until | ¹⁵ finally | ^{7 16 8} I
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PLATE 32.—A line from the record of Subject A28 reading silently in preparation for verbatim reproduction.

When Aladdin was old enough to learn a trade, his
 father took him into his own shop, and taught him how
 to use his needle, but to no purpose; for as soon as his
 father's back was turned, Aladdin was gone for that day.

PLATE 33.—Record of Subject A28. Silent reading without special directions

Aladdin was ready to start, when the magician came
 in loaded with wine, and all sorts of fruits for dessert.
 After the African magician had given what he brought
 into Aladdin's hands, he saluted his mother, and desired

PLATE 34.—Record of Subject A28. Silent reading and grammatical analysis

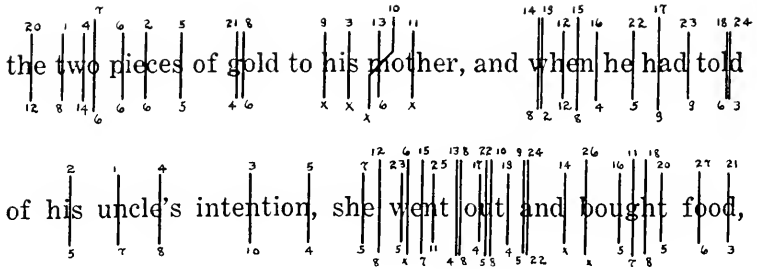


PLATE 35.—Record of the eye-movements of Subject A28 during effort to paraphrase.

Aladdin was ready to start, when the magician came
 in loaded with wine, and all sorts of fruits for dessert.
 After the African magician had given what he brought
 into Aladdin's hands, he saluted his mother, and desired

PLATE 36.—Record of Subject A29 reading silently and making grammatical analysis.

and asked him about his father. Aladdin told him about

his father and in the end told him also that his father

was long since dead. At these words, the African

magician threw his arms about Aladdin's neck and kissing

PLATE 37.—Record of Subject A₃₁ reading orally with special attention to enunciation.

lived in one of the wealthy cities of China. He was so
 poor that he could hardly support himself and his family,
 which consisted of a wife and son. His son, who was
 called Aladdin, was a good-for-nothing, and caused his

PLATE 38.—Record of Subject A31 reading orally without regard to special instructions.

When Aladdin was old enough to learn a trade, his
 father took him into his own shop, and taught him how
 to use his needle, but to no purpose; for as soon as his

PLATE 39.—Record of Subject A20 reading silently without analysis

Aladdin was ready to start, when the magician came
 in loaded with wine, and all sorts of fruits for dessert.
 After the African magician had given what he brought

PLATE 40.—Record of Subject A20 reading silently with grammatical analysis

to use his needle, but to no purpose; for as soon as his

father's back was turned, Aladdin was gone for that day.

Mustapha punished him. But Aladdin did not improve,

PLATE 41.—Record of Subject A21 reading silently without analysis

Aladdin was ready to start, when the magician came
 in loaded with wine, and all sorts of fruits for dessert.
 After the African magician had given what he brought
 into Aladdin's hands, he saluted his mother, and desired

PLATE 42.—Record of Subject A21 reading silently with grammatical analysis

Aladdin, no longer under fear of his father, gave
 himself entirely over to his idle habits, and was always
 on the streets. This course he followed till he was fifteen
 years old, without giving his mind to any useful pursuit.

PLATE 43.—Record of Subject A24 reading silently and analyzing for peculiar words.

Aladdin, no longer under fear of his father, gave
 himself entirely over to his idle habits, and was always
 on the streets. This course he followed till he was fifteen
 years old, without giving his mind to any useful pursuit.

PLATE 44.—Record of Subject A30 reading silently and analyzing for peculiar words.

When | Aladdin was | old | enough | to | learn a trade, | his
 father | took him | into his own | shop, | and taught | him how
 to | use | his | needle, | but to no | purpose; | for | as soon | as his
 father's | back was | turned, | Aladdin was | gone for that day.

PLATE 45.—Record of Subject A24 reading silently without analysis

When Aladdin was old enough to learn a trade, his
 father took him into his own shop, and taught him how
 to use his needle, but to no purpose; for as soon as his
 father's back was turned, Aladdin was gone for that day

PLATE 46.—Record of Subject A₃₀ reading silently without analysis

noted that the disturbance appears most clearly in the immediate neighborhood of verbs.

As in the case of Subject A27, so in the case of Subject A29, the demand for a reproduction of the ideas was responded to with less effort than either the demand to read silently and answer questions or the demand to read silently and report word for word.

Subject A31 evidently was a great deal disturbed by the demand for special attention to pronunciation and enunciation. This is seen if the record for the fourth passage is compared with the record for oral reading of the first passage. Sample lines of the records are given in Plates 37 and 38. Special attention should be paid, in examining these plates, to the time records of the various fixations.

Other subjects than those who have been reported thus far in this chapter were put through the series of tests. The photographs of their eye-movements were not sufficiently successful to yield full records. There were, however, usable portions of records and these confirm the findings which have been presented. A number of these partial records are worth reproducing.

Plates 39 and 40 show the contrast between simple reading and grammatical analysis for Subject A20, and Plates 41 and 42 bring out the same contrast for Subject A21. Comparing Subjects A20 and A21, it will be noted that Subject A21 is in general a more rapid reader than Subject A20.

Subjects A24 and A30 are reported in Plates 43 and 44 in respect to their efforts to locate peculiar words, and records of their silent reading under the conditions of the second test are added for comparison in Plates 45 and 46.

In preparation for the records described in the next chapter, fifteen subjects were required to paraphrase passages. The result in every case is similar to that described in detail for Subject A23. The reading breaks down to such an extent that the process can no longer be adequately described as a reading process.

The effects of asking various subjects to give particular emphasis to pronunciation are quite irregular. Some subjects do not seem to be seriously disturbed by this demand; others are much disturbed. A like disagreement appears in the case of records of silent reading for dictation of ideas and silent reading for verbatim repetition. These facts probably mean that the accidents of individual training are such that in some cases economical methods of one or the other of these operations have been fully mastered, while in other cases crude methods have been picked up

and never refined to the point where the subject can perform the requirement in question without distraction.

Such a conclusion brings us back at the end of the discussion of records to the fundamental pedagogical applications of the whole study. So long as teachers fail to discriminate between different forms of reading and different forms of analytical study, pupils will adopt a purely accidental method. Fortunately, some are forced by circumstances to adopt intellectual methods which are highly advantageous. Others unfortunately, never acquire fluent habits. They are, from the nature of the case, uncritical of their own methods, since there has never come into their experiences any demand for improvement. They are utterly unguided because it has never occurred to teachers to train them for the different kinds of analytical tasks and forms of reading. Since here, as elsewhere in the world, the chances of going wrong are more numerous than the chances of going right, the great majority, even of mature and otherwise well-trained people, exhibit some lines along which they are peculiarly incompetent.

What is needed in the educational management of young people is, first of all, a clear understanding of the special demands of each type of reading and the special methods of each type of analysis. When teachers are clear on these matters, there will rapidly accumulate through school practice satisfactory methods of dealing with each situation.

CHAPTER V

READING FOREIGN LANGUAGES

So much of the time of the high school is devoted to instruction in foreign languages that no study of reading of the more complex types is complete which does not raise such questions as the following: What do high-school pupils do when they learn foreign languages? Do they read or do they exhibit some form of analytical study that cannot be described as reading?

In any attempt to answer such questions as these, one must, of course, be prepared to define very clearly the exact purpose and scope of the discussion. There are so many vested interests and bitter partisan prejudices in this field that while the scientist may roam at will among the problems of vernacular reading and excite no animosities, he must step with caution when he approaches the citadel of foreign-language instruction in the high school.

This chapter reports records of what students from seven high schools did when confronted with (*a*) passages in English; (*b*) mixed passages containing in some instances French words and phrases, in other instances Latin words and phrases; and (*c*) pure French or Latin passages.

Students were chosen from seven high schools for the reason that results secured from a single school would not be accepted as typical. The seven schools in or near Chicago from which students were taken are as follows: the Hyde Park High School, the Englewood High School, the Joliet Township High School, the Evanston Township High School, the Oak Park Township High School, the Deerfield-Shields Township High School, and the University High School of the University of Chicago. These schools, needless to say, fulfil all of the conditions of high-grade instruction in French and Latin. Their students are admitted each year to the most exacting colleges in the country.

Each school was asked to co-operate in the investigation by sending, in November and December, 1921, two of the best students in third-year French and two of the best students in third-year Latin. The schools responded generously to the invitation, and in each case the young people came with their teachers and took the tests.

The third year was chosen for obvious reasons. In the first place, the pursuit of the language for two years and one term guaranteed such

training as the departments would surely recognize as carrying the student beyond the rudiments. In the second place, the investigations of President Brown¹ make it perfectly clear that Latin comes to a crucial period in the third year.

The best students were selected because it was not intended in this study to make an exhaustive investigation of all of the immature stages through which the languages pass. It was the purpose of this investigation merely to deal with the foreign languages as examples of reading for the purpose of throwing light on the general psychological and educational character of the reading process.

Students in two languages were taken because it was thought that it would be well to compare foreign languages with each other, as well as with English. Only two foreign languages were included in the inquiry because there is at the present time no third which can properly be compared with French and Latin.

Again, in defining the scope of the present investigation, let it be said explicitly that this is an inquiry into reading. It is not an inquiry into the best methods of teaching French and Latin. It is not an inquiry into the relative ease or difficulty of either of the languages. It deals with these languages as specimens of pedagogical material. It is assumed that the languages are taught in the schools with a view to teaching students to read them. If there is anyone who thinks that French or Latin ought not to be read in the high school, he should stop reading this chapter at this point. If there is anyone who thinks that Latin or French should be investigated for a thousand other virtues besides training students in reading, he must regard his belief as outside of the scope of this monograph. We are not making an inquiry into virtues; we are dealing purely and simply with the mode of reading French and Latin exhibited by high-grade high-school pupils.

In order to economize the time of those who are not interested in details, it may be stated that the results show that in no case does a third-year student of the best grade in seven high schools in and around Chicago read Latin. By contrast, most of the pupils who have had a corresponding amount of French show characteristic symptoms of reading, although their reading is of a labored type.

The Latin students are interesting for what they do as well as for what they do not do. They do something that corresponds fairly closely to what was found in the paraphrasing tests described in the last chapter.

¹H. A. Brown, *Latin in Secondary Schools*. Oshkosh, Wisconsin: State Normal School, 1919. Pp. x+170.

They dwell on words, and they fixate points in a passage with repeated forward and backward movements. The chief difference between what these students do in Latin and what they do in paraphrasing is that they exhibit in Latin somewhat greater confusion than in paraphrasing.

With this introduction we turn to an exhibition of details.

In order to establish a background for the study of high-school French and Latin, records were secured of the reading of these languages by mature students. Such students were easily accessible through the departments of the University of Chicago. For Latin two graduate students were photographed. For French a number of undergraduates were photographed.

Plates 47 to 51 give four lines each from the records of five students of varying degrees of proficiency in French. The reading in each case was tested for comprehension by asking the reader to write out what he had read. The results of this part of the test were entirely satisfactory.

Plates 52 and 53 give four lines each from the records of two graduate students in Latin. These also show different degrees of mastery of Latin. For purposes of comparison records were taken from these subjects of their ability to read English narrative prose. The results are shown in Plates 54 and 55.

Though outside of the immediate scope of this study, a German record may be brought in, together with an English record from the same subject. These are shown in Plates 56 and 57.

These mature foreign-language records show that a foreign language can be read in a manner directly comparable to the reading of the vernacular. To be sure, there are more pauses in a line of the German, Latin, and French than in a line of English, but the manner of reading is fundamentally the same. There is a forward movement of the eyes which shows that the reader is moving steadily toward the goal of an intelligent comprehension of what he is passing over.

Another totally different type of comparative material was collected before the Latin and French records were taken. This material constituted the subject-matter of the preceding chapter. All of the subjects who read either French or Latin read some English before reading the foreign language. Some of the students read several different kinds of passages, as reported. The clear indications of analytical mental processes which were presented in the study of these earlier records will guide our interpretation of the cases, to the study of which we now turn.

The passages used in the foreign-language reading were prepared in a series of ascending degrees of difficulty. The easiest passage was made

L'armée se divise en deux parties, l'armée régulière et l'armée
 territoriale. Aux termes de la loi du 21 mars 1905, tout Fran-
 çais doit le service militaire de l'âge de vingt ans jusqu'à l'âge
 de quarante-cinq ans. Les hommes atteints d'infirmités graves

PLATE 47.—Record of Subject H.E. reading silently a French passage

L'armée se divise en deux parties, l'armée régulière et l'armée
 territoriale. Aux termes de la loi du 21 mars 1905, tout Fran-
 çais doit le service militaire de l'âge de vingt ans jusqu'à l'âge
 de quarante-cinq ans. Les hommes atteints d'infirmités graves

PLATE 48.—Record of Subject J.F. reading silently a French passage

L'armée se divise en deux parties, l'armée régulière et l'armée
 territoriale. Aux termes de la loi du 21 mars 1905, tout Fran-
 çais doit le service militaire de l'âge de vingt ans jusqu'à l'âge
 de quarante-cinq ans. Les hommes atteints d'infirmités graves

PLATE 49.—Record of Subject N.F. reading silently a French passage

L'armée se divise en deux parties, l'armée régulière et l'armée
 territoriale. Aux termes de la loi du 21 mars 1905, tout Fran-
 çais doit le service militaire de l'âge de vingt ans jusqu'à l'âge
 de quarante-cinq ans. Les hommes atteints d'infirmités graves

PLATE 50.—Record of Subject B.F. reading silently a French passage

L'armée se divise en deux parties, l'armée régulière et l'armée
 territoriale. Aux termes de la loi du 21 mars 1905, tout Fran-
 çais doit le service militaire de l'âge de vingt ans jusqu'à l'âge
 de quarante-cinq ans. Les hommes atteints d'infirmités graves

PLATE 51.—Record of Subject S.D. reading silently a French passage

Pompeius suorum omnium hortatu statuerat praelio decertare.

Simul Cæsar toti exercitui imperavit ne iniussu suo concurreret.

Dixit se, cum id fieri vellet, signum daturum. Nostri milites dato

signo progressi sunt. Eodem tempore equites ab sinistro Pompeii

PLATE 52.—Record of Subject B.B. reading silently a Latin passage

Pompeius suorum omnium hortatu statuerat praelio decertare

Simul Cæsar toti exercitui imperavit ne iniussu suo concurreret.

Dixit se, cum id fieri vellet, signum daturum. Nostri milites dato

signo progressi sunt. Eodem tempore equites ab sinistro Pompeii

PLATE 53.—Record of Subject F.H. reading silently a Latin passage

The old football scrimmage smile was on Shock's face as he
 stood waiting for Carroll to rise. The whole incident had oc-
 curred so unexpectedly and so suddenly that the crowd stood
 amazed, quite unable to realize just what had happened.

PLATE 54.—Record of Subject B.B. reading silently an English passage

The old football scrimmage smile was on Shock's face as he
 stood waiting for Carroll to rise. The whole incident had oc-
 curred so unexpectedly and so suddenly that the crowd stood
 amazed, quite unable to realize just what had happened.

PLATE 55.—Record of Subject F.H. reading silently an English passage

„Und doch,“ nahm der junge vornehme Herr das Wort,
 „doch möchte ich nicht so ganz vergessen, was er gesagt.
 Erinnert Euch an die Gerüchte von jenen Leuten, die in
 diesem Wald auf einmal spurlos verschwunden sind. Web-

PLATE 56.—Record of Subject F.D. reading silently a German passage

The old football scrimmage smile was on Shock's face as he
 stood waiting for Carroll to rise. The whole incident had oc-
 curred so unexpectedly and so suddenly that the crowd stood
 amazed, quite unable to realize just what had happened.

PLATE 57.—Record of Subject F.D. reading silently an English passage

up of a mixture of English and the foreign language. Enough of the meaning of the passage could be secured by the student from the English so that, even if he could not translate the foreign phrases, he would get through most, if not all, of the passage. In the next more difficult passage the foreign words and phrases preponderated. In the third and fourth passages only foreign words appeared. The two passages which were made up entirely of French were of about the same degree of difficulty. In the case of the passages made up wholly of Latin, the first was taken from the early part of a second-year Latin reader, and the second was taken from one of the books of Caesar which the pupils were not likely to have read.

The French passages are reproduced in full, as follows:

The vengeance **des hommes**, as Dantès had already said to himself, had plunged him into the abyss **où il se trouvait**. He **était** innocent of the political crime **dont on l'accusait**, the crime of having conspired **pour le retour de Napoléon Ier**. In 1815, Dantès **avait été** a sailor in the merchant marine. **Pendant une traversée** the captain of this boat **tomba malade** and feeling that he was going to **mourir** he asked Dantès to turn toward the island of Elbe and **de remettre une lettre** to Marshall Bertrand, the confidant of Napoléon.

Les prières d'un supérieur sont des ordres. After the death of the captain Dantès **obéit à ses ordres, sans rien savoir du contenu de la lettre**. Mais Danglars, the only enemy of Dantès **à bord du navire avait entendu** the conversation **entre le capitaine et lui** and he had surmised **tout de suite une conspiration bonapartiste**. Upon his return from the island of Elbe, Danglars **vit qu'il tenait à la main une autre lettre**.

Le 25 février on arriva à Marseille. Dantès courut voir son vieux père avant de repartir pour porter en personne à Paris la réponse de l'île d'Elbe. Mais le lendemain il fut arrêté. Danglars l'avait dénoncé à la police. "On aura la preuve de son crime en l'arretant" dit-il, "car on trouvera une lettre pour le comité bonapartiste de Paris ou sur lui ou chez son père, ou dans sa cabine à bord du navire." Traîné devant le juge, Dantès fournit des preuves de son innocence.

Il allait être mis en liberté lorsque le juge découvrit que la réponse de l'île Elbe était adressée à un M. Noirtier. — Or ce Noirtier était le père de juge, père qui, à cause de ses opinions politiques, avait toujours été un obstacle au bonheur de son fils. Sans plus hésiter, le juge envoya Dantès au château d'If, sombre prison sur une île près de Marseille, prison destinée aux grands coupables politiques.

The Latin passages are as follows:

There were at one time **duo** very celebrated artists, **alter** of whom was called Zeuxis, **alter** Parrhasius. Zeuxis had painted a **puerum** carrying grapes, and so **bene** had he imitated **naturam** that the birds flew to his painting and **conarentur** to eat the grapes. Then Parrhasius **attulit** his painting, in **qua** he had painted a curtain. Parrhasius, however, **videbatur** to delay, and Zeuxis being deceived **inquit**: "Draw aside the curtain that I may see the **tabulam**." But **statim** he perceived his **errorem**, and gave Parrhasius the **praemium** with these **verbis**: "Ego deceived only the birds, **tu** have deceived me."

After this **proelium** the Athenienses gave **eidem** Miltiades **classem** of seventy **navium** that he might proceed against the **insulas** which had assisted the **barbaros**. With this **imperio** Miltiades **coegit** a considerable number to **redire** to their **officium** but **nonnullas** he captured **vi**. **Cum** he could not **oratione conciliare** the **insulam** Paros, which was **elatam opibus**, **eduxit** his **copias** from **navibus**, **clausit** the city **operibus**, and **privavit** it of all **commeatu**. **Tum**, having erected **vineis** **ac testudinibus**, **accessit** nearer the **muros**.

Numa Pompilius rex Romae creatus est, qui bellum quidem nullum gessit, sed civitati tamen magnopere profuit. Nam et leges Romanis moresque constituit, et annum in decem menses descripsit, et sacra Romae ac templa constituit. Huic successit Tullus Hostilius, qui bella reparavit, Albanos vicit, Veientes et Fidenates bello superavit, et urbem maiorem fecit. Deinde regnum Tarquinius accepit.

Mittit primum Brutum adolescentem cum cohortibus Caesar, post cum aliis C. Fabium legatum; postremo ipse cum vehementius pugnaretur, integros subsidio adducit. Restituto proelio ac repulsis hostibus, eo quo Labienum miserat contendit; cohortes quattuor ex proximo castello deducit, equitum partem se sequi, partem circumire exteriores munitiones, et a tergo impetum in hostes facere iubet.

The procedure in using these passages was as follows: The student was given the first passage from the story of Aladdin in English and was asked to read it out loud. No special directions were given. At the end of the reading two questions were asked. Second, the student was asked to read to himself the second Aladdin passage, and two questions were asked. At this point, in the case of some of the students, the long series of tests described in the preceding chapter was carried out; in other cases the foreign-language series was begun at once.

The foreign-language passages were taken up as follows: The student was told that a passage would be shown telling a story in English and that he would find scattered through this passage a few foreign words and phrases. He was told to read the passage to himself and then to go back to the beginning and read the passage aloud, translating into English each of the foreign words.

After he had done as directed a second passage was shown him, with the preliminary statement that it would have more foreign words than the first. He was asked, as before, to read it silently and then to translate.

The third passage, made up of foreign words throughout, was described, and the student was told to read it silently and then to translate.

The procedure with the fourth passage varied slightly in that the student was asked to pronounce the text in French or Latin before he read it silently. After that he was to proceed as in the other cases.

This procedure gave the student in every case the advantage of a silent reading before he had to translate. It also gave the experimenter a check on the student's understanding of the passage. The translation was in every case dictated into a phonograph.

Since the French records are distinctly superior to the Latin records, we may make an analysis of one of the French records as introductory to the general study. The subject whose record is to be used for this purpose was selected on several grounds. In the first place, her records are among those used in the last chapter; we know, therefore, a great deal

in detail about her reading habits. Second, her records in French are near the median of the general table which will be presented later. Third, her photographic records are exceptionally clear so that there were very few points in which the record could not be accurately and readily interpreted. The case cannot be regarded as average or typical in any definite mathematical sense, but it is a fair sample of French reading as exhibited by the schools examined.

Subject A₂₃ is a high-school Junior. She has been taught French by a combination method which gives a great deal of direct practice in oral French and at the same time lays emphasis on grammatical analysis in each recitation. Her instruction, as contrasted with the Latin teaching which will be studied later, was more largely by the "direct" method; as contrasted with some of the French teaching, it was more grammatical.

We may properly begin with her reading of ordinary English prose. Plate 58 gives a part of her record for silent reading under the conditions described in the preceding chapter for the second passage. Her paraphrasing, which may be thought of as the extreme example of analytical study, was more labored than average, involving 48.0 fixations per line, with an average duration of 9.0 twenty-fifths of a second.

Plates 59 and 60 show respectively the first four lines of silent reading and oral translation of the first passage in which French appears. It is very obvious that this subject does not read French as she reads English. The French records show that when she comes to a foreign word or phrase there is very frequently a slowing up, which proves that the French requires more effort than does ordinary English.

Certain interesting contrasts appear also between the silent and oral French records. The end of the fourth line is read silently without any indication of increased effort. When, however, it comes to translating this line, we find the subject showing the typical symptoms of effort. The record for oral translation is distinctly analytical in character.

Two hypotheses can be formulated to explain the facts here observed. Either the reader got the idea easily from a direct inspection of the French and was confused later by the demand that she find English equivalents for the French words, or else she slighted the passage in the first instance and missed the full meaning but had no such escape when it came to the translation.

There can be no doubt that there are cases which show the same symptoms as this which are explained by the first type of hypothesis. For example, the long processes of paraphrasing described in Chapter IV are of this type. On the other hand, there are certainly cases where the

When Aladdin was old enough to learn a trade, his
 father took him into his own shop, and taught him how
 to use his needle, but to no purpose; for as soon as his
 father's back was turned, Aladdin was gone for that day.

PLATE 58.—Record of Subject A23 reading silently an English passage

The vengeance des hommes, as Dantès had already
 said to himself, had plunged him into the abyss où il se
 trouvait. He était innocent of the political crime dont on
 l'accusait, the crime of having conspired pour le retour de

PLATE 59.—Record of Subject A23 reading silently the simplest mixed English and French passage.

The vengeance des hommes, as Dantes had already
 said to himself, had plunged him into the abyss où il se
 trouvait. He était innocent of the political crime dont on
 l'accusait, the crime of having conspired pour le retour de

PLATE 60.—Record of Subject A23 reading aloud and translating the simplest mixed English and French passage.

reader skims through a passage and simply drops out of his thinking any feeling of responsibility.

In this particular case, the probable explanation is the first, because the student knew that in a moment she would have to translate and, furthermore, she succeeded in translating the passage very well.

A very striking example of what is meant by the analysis of a line can be seen if we plot, by the more elaborate method, the second and third lines of the silent record. Plates 61 and 62 show these two lines. Plate 61 shows the typical straightforward movement of the eye in reading a passage that is fully comprehended without very much analysis. To be sure, even in this plate, there is some regression, as in fixations 2, 5, and 13, but the regressions are isolated, individual movements. The third line, as shown in Plate 62, is, on the contrary, full of genuine efforts at analysis, involving, not isolated regressions, but series of efforts to master difficulties that require more than a single glance backward.

A question always arises when analysis is shown by a series of eye-movements as to the degree of backward and forward movement that may be thought of as justifying the statement that the subject is not reading the passage. It is, for example, evident from these French records that the subject is forced to make more of an analysis than is necessary in the reading of English prose, but one would hesitate to render the verdict, even in these two lines, that the subject is not reading. Definition comes to be a matter of degree. If analysis goes too far, then the reading must be thought of as superseded or interrupted by something that is not reading. Without attempting to answer the question as to the degree of analysis which marks the boundary of reading, we may go on with the study of records, mindful, however, of the necessity of deciding sooner or later when the line is crossed.

Subject A23's reading of the second mixed passage is exhibited in Plates 63 and 64. Perhaps the most striking new phenomenon in this case is the way in which the preparation secured in the silent reading of the third line carried over into the oral translation of this line.

The performance of this subject throughout is such as to prove that she is master of the situation, though only with effort.

The sixth line of this passage gave Subject A23 serious difficulty when she tried to translate it. The silent reading was done with no clear symptom of confusion. One regression at the end of the line may have been due to some slight recognition of difficulty. But the translation brought out the difficulty in a striking way. The translation showed also that the subject was not clear as to the meaning of the adjective in

¹² | ¹³ | ¹ | ³ | ⁵ | ⁴ | ⁶ | ⁷ | ⁸ | ⁹ | ¹⁰ | ¹¹ | ¹⁴ | ¹²
 said to himself, had plunged him into the abyss ou il se
 5 | 11 | 4 | 7 | 6 | 5 | 4 | 6 | 7 | 7 | 9 | 4 | 8 | 2

aid to him

said to

to himself

plunged h

had plun

ged him in

him into

into the

he abyss o

byss ou il

s ou il se

il se

said to h

u il se

PLATE 61.—Rearrangement of the record of the second line shown in Plate 59

³trou⁴vait.⁵ ⁶He ⁷était ⁸innocent ⁹de ¹⁰la ¹¹politique ¹²crime ¹³dont ¹⁴on ¹⁵

t. He éta
 ait innoce
 trouva
 trouva

He était

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PLATE 62.—Rearrangement of the record of the third line shown in Plate 59

Les prières d'un supérieur sont des ordres. After the
 death of the captain Dantès obéit à ses ordres, sans rien
 savoir du contenu de la lettre. Mais Danglars, the only
 enemy of Dantès à bord du navire avait entendu the
 conversation entre le capitaine et lui and he had surmised
 tout de suite une conspiration bonapartiste. Upon his

PLATE 63.—Record of Subject A23 reading silently the more complex mixed English and French passage.

Les prières d'un supérieur sont des ordres. After the
 death of the captain Dantès obéit à ses ordres, sans rien
 savoir du contenu de la lettre. Mais Danglars, the only
 enemy of Dantès à bord du navire avait entendu the
 conversation entre le capitaine et lui and he had surmised
 tout de suite une conspiration bonapartiste. Upon his

PLATE 64.—Record of Subject A23 reading orally and translating the more complex mixed English and French passage.

Le 25 février on arriva à Marseille. Dantès courut
 voir son vieux père avant de repartir pour porter en
 personne à Paris la réponse de l'île d'Elbe. Mais le
 lendemain il fut arrêté. Danglars l'avait dénoncé à la

PLATE 65.—Record of Subject A23 reading silently a French passage

Le 25^e février on arriva à Marseille. Dantès courut
 voir son vieux père avant de repartir pour porter en
 personne à Paris la réponse de l'île d'Elbe. Mais le
 lendemain il fut arrêté. Danglars l'avait dénoncé à la

PLATE 66.—Record of Subject A23 translating orally a French passage

this case. The silent reading was probably felt to be satisfactory, because the main idea embodied in the noun was grasped and the adjective was recognized as of minor importance.

Plates 65 and 66 show the records of Subject A23 in coping with the first passage which is wholly French. Symptoms of extreme effort are by no means wanting. There are here and there very long fixation pauses. There are a great many fixations per line. There is regression and even analysis. Still the subject is getting through. She is doing the task that is here set for her more readily than she paraphrased an English passage. The reason for this is doubtless to be found in the mode of school training. Paraphrasing is seldom taught, and the student

TABLE XVII
RECORD OF SUBJECT A23 FOR THE READING OF MIXED PASSAGES
AND FRENCH PASSAGES

Kind of Reading	Average Number of Fixations per Line	Average Duration of Fixation Pauses
First mixed:		
Silent reading	12.7	6.3
Oral translation	13.4	7.8
Second mixed:		
Silent reading	13.1	6.4
Oral translation	15.8	7.7
First French:		
Silent reading	14.1	6.1
Oral translation	20.6	7.7
Second French:		
Pronunciation	19.4	7.5
Silent reading	12.4	6.5
Oral translation	22.2	7.4

confronted by a vernacular phrase or word is not accustomed to finding in his mind the synonym which will permit paraphrasing. On the other hand, school training has constantly been giving practice in the finding of translations for French words, and so the subject translates better than she paraphrases.

The second French passage was first pronounced in French. The record, Plate 67, gives us an opportunity to study a type of analysis not dealt with in earlier examples. The only demand here made on the subject is that she pronounce one French phrase after another. Any analysis which she makes in this case will not be for the purpose of getting meaning out of the passage but merely for the sake of guiding pronunciation. The successive fixations are, therefore, comparatively straightforward. This appears in a very striking way if one contrasts Plates 67 and 68, the latter of which shows the record of silent reading. For

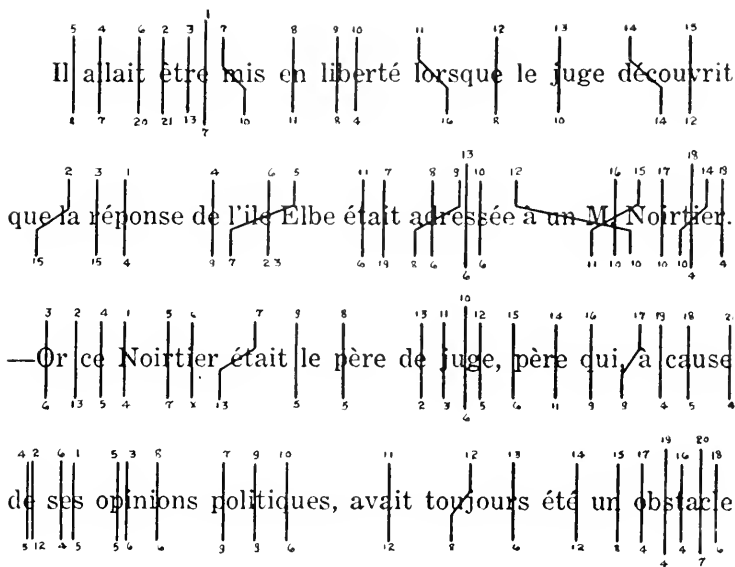


PLATE 67.—Record of Subject A23 pronouncing the words of a French passage

Il allait être mis en liberté lorsque le juge découvrit

 que la réponse de l'île Elbe était adressée à un M. Noirtier.

 — Or ce Noirtier était le père de juge, père qui, à cause

 de ses opinions politiques, avait toujours été un obstacle

PLATE 68.—Record of Subject A23 reading silently a French passage after having pronounced it.

1 5 4 3 6 2 10 7 8 9 11 12 13 14 15 16
 Il allait être mis en liberté lorsque le juge découvrit
 3 11 8 12 17 6 9 3 7 5 18 5 6 7 3
 4 6 3 5 8 14 13 11 12 15 17 16 18 13 21 20 22 23 24
 que la réponse de Nle Elbe était adressée à un M. Noirtier.
 2 1 3 5 6 4 7 10 12 7 10 11 13 14 15 17 16 15 21 19 20
 6 3 2 4 7 10 9 12 7 10 7 5 5 4 19 9 5 11 7 7
 4 3 6 5 3 10 12 11 13 14 15 17 16 15 21 19 20
 — Or ce Noirtier était le père de juge, père qui, à cause
 12 4 6 5 3 8 5 4 4 15 14 8 11 3 1 6 4
 2 13 15 3 16 17 4 5 18 6 19 20 8 7 21 22 14 11
 18 2 4 5 7 6 3 11 14 10 10 8 2 5 12 21 10 3 6 4
 x 13 7

PLATE 69.—Record of Subject A23 translating orally a French passage

lendemain il fut arrêté. Danglars l'avait dénoncé à la
 police. "On aura la preuve de son crime en l'arrestant"
 dit-il, "car on trouvera une lettre pour le comité
 bonapartiste de Paris ou sur lui ou chez son père, ou dans

PLATE 70.—Record of Subject A27 reading silently a French passage

the sake of completeness Plate 69 gives the record of oral translation of the last French passage.

A statistical summary of the records made by Subject A23, including not only the lines shown in the plates but also all except the first and last lines of each passage which was read, is presented in Table XVII. The figures, when compared with those given in Table XII, show that the reading of French is more difficult for this subject than any of the tasks canvassed in the last chapter, except paraphrasing.

Subjects A27 and A28 read French and were also reported in the preceding chapter for various forms of analytical reading. Statistical summaries are given for the French records in Table XVIII. The

TABLE XVIII
RECORDS OF SUBJECTS A27 AND A28 FOR THE READING OF
MIXED PASSAGES AND FRENCH PASSAGES

KIND OF READING	AVERAGE NUMBER OF FIXATIONS PER LINE		AVERAGE DURATION OF FIXATION PAUSES	
	Subject A27	Subject A28	Subject A27	Subject A28
First mixed:				
Silent reading	11.5	9.2	5.5	6.0
Oral translation	13.6	11.1	7.1	6.4
Second mixed:				
Silent reading	14.7	10.4	6.3	5.9
Oral translation	12.0	12.0	10.0	7.3
First French:				
Silent reading	11.7	9.7	6.8	6.2
Oral translation	21.0	13.2	8.1	7.1
Second French:				
Pronunciation	15.7	16.4	8.6	7.0
Silent reading	10.1	10.2	6.7	5.8
Oral translation	17.1	16.2	7.3	6.8

reader's attention will immediately be attracted in this table by the large number of fixations and by the long average duration of the fixation pauses shown by Subject A27 in the oral translation of the first French passage. Examination of the records shows that the silent reading was done fluently, as though the subject were having no difficulty. Four lines are shown in Plate 70. When it came to the oral translation, difficulties piled up, as shown in Plate 71. Especially in the line beginning *dit-il* is there evidence that the subject lost entirely the thread of the narrative.

This line is one of the worst which appears in any of the French records. It is quite certain that even worse records could be secured if students of a lower rank of efficiency were tested. The object of this

investigation was, however, as pointed out before, not to study the various stages of perfection of the ability to read French, but to find out how reading in this language compares with the reading of the vernacular. In the case reported in Plate 71 we have reached a point where, for a time at least, reading certainly breaks down completely. Here is

TABLE XIX

AVERAGE NUMBER OF FIXATIONS PER LINE OF NINE SUBJECTS FOR THE READING OF MIXED PASSAGES AND FRENCH PASSAGES

KIND OF READING	SUBJECTS								
	A ₂	A ₃	A ₈	A ₉	A ₁₃	A ₁₆	A ₂₀	A ₂₄	A ₃₄
First mixed:									
Silent reading	10.2	9.4	.....	10.6	12.1	9.1	10.2	10.0	12.9
Oral translation	11.4	10.6	12.0	14.7	13.3	.....	12.4	10.8	13.3
Second mixed:									
Silent reading	10.7	12.2	10.1	11.1	13.1	.....	.....	.....	15.1
Oral translation	16.2	11.5	.....	12.4	.....	11.7	12.1	14.3	.....
First French:									
Silent reading	12.2	.....	9.6	.....	14.4	11.1	9.9	.....	13.6
Oral translation . . . . .	.....	12.3	.....	13.4	22.1	16.6	13.1	14.1	19.7
Second French:									
Pronunciation . . . . .	.....	17.3	16.2	.....	20.2	19.1	14.8	17.4	21.4
Silent reading	11.1	.....	11.5	12.6	10.2	.....	9.8	12.1	11.6
Oral translation	18.1	.....	14.2	15.5	21.4	.....	14.3	21.3	.....

TABLE XX

AVERAGE DURATION OF FIXATION PAUSES OF NINE SUBJECTS FOR THE READING OF MIXED PASSAGES AND FRENCH PASSAGES

KIND OF READING	SUBJECTS								
	A ₂	A ₃	A ₈	A ₉	A ₁₃	A ₁₆	A ₂₀	A ₂₄	A ₃₄
First mixed:									
Silent reading	6.8	7.2	.....	5.6	6.0	6.4	6.0	6.5	7.1
Oral translation . . . . .	.....	.....	6.1	6.4	6.7	.....	6.3	6.9	7.5
Second mixed:									
Silent reading	6.4	6.6	6.4	6.3	7.1	.....	.....	.....	6.8
Oral translation	7.3	7.1	.....	.....	.....	6.8	.....	7.6	.....
First French:									
Silent reading	6.8	.....	6.0	.....	6.5	6.1	6.0	.....	6.6
Oral translation . . . . .	.....	6.7	.....	6.9	7.1	7.9	7.1	7.2	.....
Second French:									
Pronunciation . . . . .	.....	7.4	6.9	.....	7.4	7.6	7.0	7.1	7.8
Silent reading	7.2	.....	6.8	6.4	6.6	.....	6.5	6.1	7.1
Oral translation	7.6	.....	7.1	7.3	6.9	.....	7.2	6.9	.....

a line which requires more effort than paraphrasing. Certainly we are safe in assuming that where translation is more difficult than paraphrasing the student is not mastering the situation. Nor can a student distracted by the difficulty of such a situation develop either literary appreciation of the passage or meaning from the sentence.

It remains to present the general results from the whole group of subjects tested in French and to point out the limits which these tests

show in the ability of students in this field. Tables XIX and XX have been compiled for the purpose of presenting the general results. They are not complete because the records were not in all cases sufficiently clear to permit the experimenters to interpret them.

These tables show a degree of uniformity in the averages of students from various schools that is altogether astonishing. There are, of course, points in the tables which show marked departures from the general tendencies, but, taken all in all, the statistics show that the French students are behaving very much alike. Once more, it should, perhaps, be mentioned that these are the best third-year French students. They represent, therefore, the maximum which is to be expected of the best training in this field.

The translations given by these students were in the main satisfactory, so that it may be said that all of the evidence goes to show a mastery of French and ability to read French passages.

We turn now to a consideration of the records of fourteen Latin students. The results presented show in general a situation much more extreme than any found in the French records. Analytical types of reading are universal and of such an order as to make it evident throughout that these students have not learned to read Latin. The records of oral translation are in general not usable. The head-movements are so pronounced that they become the chief factors in the photographs of oral reading. Indeed, marked head-movements often occur in the records of silent reading, showing that the nervous tension is high.

Subject A₂₉, whose records for English reading of various types are summarized in Table XV, page 72, Chapter IV, gave three usable Latin records. His oral records cannot be used for the reason referred to in the last paragraph. His record on the Caesar passage is quite unusable, in part because of excessive head-movements, in part because he gave up trying to read the passage.

The three usable records are presented in Plates 72, 73, and 74. A cursory glance at these plates shows the experimenter at once that he is not dealing with reading. Even in the simplest mixed passage, the Latin words create so great a distraction for the reader that they interrupt the continuity of the whole passage. When a line becomes at all difficult, as in the sixth line of this passage, the analytical movements overwhelm the reading movements completely. Plate 75 gives the details of the sixth line.

The situation grows steadily worse when we pass to the second mixed passage and finally to the story of the Roman kings. Plates 76 and 77

give the details of line 6 from the second mixed passage and of line 4 from the passage made up wholly of Latin.

Statistical treatment of these records is of doubtful value. There are such varieties in the length of fixation pauses and such complexity in the successive movements that there is little justification for combining such diverse elements into averages. For purposes of comparison, however, Table XXI presents records for three passages read silently.

Records were secured from Subject A35 which make it possible to compare silent reading with oral translation of Latin. Plates 78-82 give the records. Attention is called to the long duration of many of the fixation pauses as well as to the very large number of such pauses per line. Of special interest is the contrast in type of analysis shown when Plates 80 and 82 are compared. Details of line 3 for each of these records are exhibited in Plates 83 and 84.

TABLE XXI
RECORD OF SUBJECT A29 IN SILENT READING OF MIXED
PASSAGES AND A LATIN PASSAGE

Silent Reading	Average Number of Fixations per Line	Average Duration of Fixation Pauses
First mixed	10.7	5.8
Second mixed	39.1	6.9
First Latin	45.4	7.2

There is no profit in attempting to canvass the whole series of records from the fourteen subjects who read Latin. They are alike in general character. We may, therefore, conclude our discussion by referring to two of the best. Plates 85 and 86 give portions of the records of Subject A10 for the Latin passage describing the Roman kings. The translation of the second Latin or Caesar passage by this subject is so imperfect that the record has value only as indicating what happens in an ineffectual attack. The records for pronunciation, silent reading, and oral translation of this passage are shown in Plates 87-89. Again, as in the case of Subject A35, the difference between the analysis in a pronunciation exercise and the analysis made during an attempt to understand is clearly illustrated. The complete surrender in translation is shown in lines 5 and 6 of Plate 89. A record of a Latin passage read silently by Subject A21 is given in Plate 90.

It would be interesting to know the conscious processes which are the counterpart of the record made during the attempt at silent reading.

There were at one time duo very celebrated artists,
 alter of whom was called Zeuxis, alter Parrhasius.
 Zeuxis had painted a puerum carrying grapes, and so
 bene had he imitated naturam that the birds flew to his
 painting and conarentur to eat the grapes. Then
 Parrhasius attulit his painting in qua he had painted a

PLATE 72.—Record of Subject A29 reading silently a simple mixed English and Latin passage.

After this proelium the Athenienses gave eidem

Miltiades classem of seventy navium that he might

proceed against the insulas which had assisted the

barbaros. With this imperio Miltiades coegit a considerable

number to redire to their officium but nonnullas he

captured vi. Cum he could not oratione conciliare the

PLATE 73.—Record of Subject A29 reading silently a complex mixed English and Latin passage.

¹ ¹⁴ ² ¹⁵ ¹⁴ ⁷ ¹³ ³ ¹² ⁸ ⁴ ⁶ ⁵ ¹⁷ ¹⁰ ⁹ ¹⁵ ²⁰ ²¹ ²² ²³
 Parrhasius attulit his painting in qua he had painted a
₅ ₇ ₆ ₇ ₅ ₇ ₆ ₄ ₆ ₅ ₄ ₃ ₄ ₁₀ ₆ ₅ ₅ ₄ ₈ ₆

Parrhas

Parrhasius

attulit h

ulit his p

s painting

t his pain

s attulit

attulit hi

n qua he p

g in qua h

us attulit

attulit hi

s attulit h

sius attul

sius attul

Parrhasi

ting in qua

qua he ha

in qua he

a he had p
had paint

ad painted

ted a

PLATE 75.—Rearrangement of the record of the sixth line shown in Plate 72

captured vi. Cum he could not prations conciliate the

captured v
captur
ured vi.
i. Cum he
tured vi.

captured

captured v
d vi. Cum

he could
he could n
m he could
not oratio

atione con
ould not o
he could
could not
ld not ora
ould not o

um he coul
could not
t oratione
ratione o
d not orat
ratione co
t oratione
ione conci

um he coul
he could n
ld not ora
not oratio
atione con

ot oration
tione cono

iliasre the
iasre the
conciliar
conciliars
ciliars th
re the

aptured vi
vi. Cum h
aptured
red vi. C
ptured vi.
apture
Cum he o
Cum he co

nciliars t

liarsre the
e concilia
iliarsre the

ne concilli

²⁴ 2 ²³ 4 ²² 7 ²¹ 10 ²⁰ 18 ¹⁹ 17 ¹⁸ 16 ¹⁷ 15 ¹⁶ 14 ¹⁵ 13 ¹⁴ 12 ¹³ 11 ¹² 10 ¹¹ 9 ¹⁰ 8 ⁹ 7 ⁸ 6 ⁷ 5 ⁶ 4 ⁵ 3 ⁴ 2 ³ 1 ² 1
 annum in decem menses descripsit, et sacra Romae ac

num in de

annum in
in decem

in decem
ecem mense
decem mens

m menses d
s descrips
scripsit,
it, et sac

e ac

n ses descr
descripsit

s descrips

scripsit,
descripsit
cripsit, e

n ses descr

menses des

decem mens

num in deo

n decem me
num in de

annum in
m in decem

es descrip
em menses

ecem mense

cripsit, e
scripsit,

in decem m
com mense
menses de
nes descr

et sacra
t sacra Ro
sacra Roma

et sacra

es descrip

enses desc

et sacra
sacra Roma

Romae ac
sacra Roma

et sacra R
a Romae ac

mae ac
Romae ac

e ac

PLATE 77.—Rearrangement of the record of the fourth line shown in Plate 74

1 17 16 2 3 15 14 5 13 6 12 7 11 10 8 9 15 19 20 21
 Numa Pompilius rex Romae creatus est, qui bellum
 4 8 3 23 7 4 3 5 11 5 9 8 11 17 3 2 6 5 15
 2 1 9 3 6 5 17 18 19 20 11 13 21 10
 quidem nullum gessit, sed civitati tamen magnopere
 8 7 4 14 6 5 16 15 17 18 19 12 11 13 21 10
 15 13 4 13 7 7 9 8 7 5 6 11 15 9 7 3 2 5 8
 2 1 4 8 3 10 9 11 12 6 15 23 16 24 25 17 18 19 20 21 26
 profuit. Nam et leges Romanis moresque constituit, et
 16 4 10 12 6 3 7 7 4 5 6 11 9 14 2 7 8 11 5 9 4 6
 4 14 13 2 6 8 7 1 10 9 11 12 16 17 18
 annum in decem menses descripsit, et sacra Romae ac
 5 15 4 14 13 2 6 8 7 1 10 9 11 12 16 17 18
 16 6 5 2 4 3 17 11 6 1 14 5 9 5 3 3 3

PLATE 78.—Record of Subject A35 reading silently a simple Latin passage

Numa Pompilius rex Romae creatus est, qui bellum
 quidem nullum gessit, sed civitati tamen magno opere
 profuit. Nam et leges Romanis moresque constituit, et
 annum in decem menses descripsit, et sacra Romae ac

PLATE 79.—Record of Subject A35 translating orally a simple Latin passage

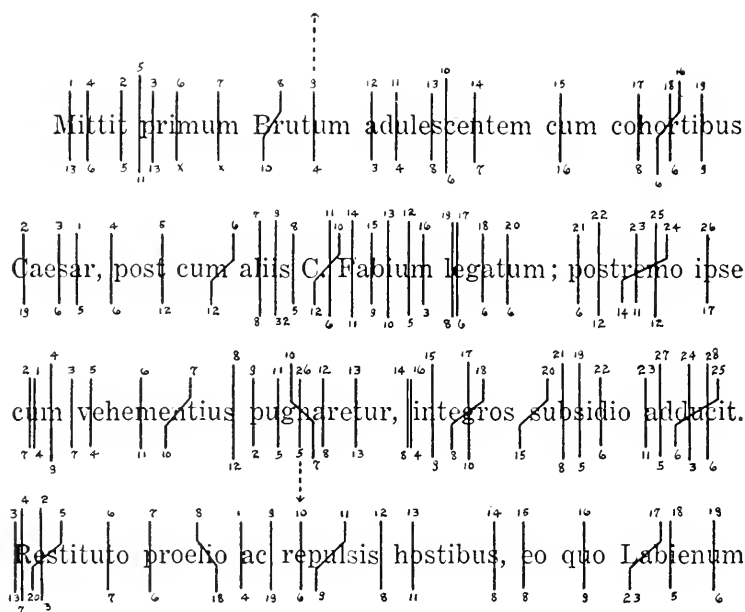


PLATE 80.—Record of Subject A35 pronouncing the words in a Latin passage

The subject wanders about among the Latin words. One can imagine vaguely what would happen to a reader's thinking if he wandered about an English line in the same fashion.

The other Latin records are all of the type of those exhibited. There are no Latin records superior to those exhibited. No student made a passable translation of the Caesar passage.

The significance of these records is not difficult to discover. Latin students are not taught to read. They are trained only to look at words. Not only so, but they are so trained to look at words that it is quite impossible to find any system in their looking. There seem to be no mental devices in their experience for disentangling a complex of Latin words. Of course, the chief instrument used for this purpose in ordinary school work is entirely withdrawn in these experiments. The student usually depends on the vocabulary at the end of the book for help in translating Latin. From the beginning of his study he is encouraged to use the vocabulary rather than to attempt to carry anything in his mind. The result is that when the vocabulary is withdrawn the world looks like a great confusion. ✓

When series of fixations in apparently chaotic order were first encountered by experimenters dealing with photographs of eye-movements of children who were just beginning to read, someone invented the phrase "periods of confusion" as a descriptive name for the aimless attack of the baffled child who does not know how to solve the mystery of some unintelligible word. "Periods of confusion" will not serve in this case because the confusion is pervasive and permeates whole lines and even whole passages. ✓

✓ Indeed, we have come to these extraordinary exhibitions of forward and backward movements gradually enough so that it is possible to understand their meaning. The numerous irregular movements of the eyes show that the subject is trying to break up the situation into elements. If he were dealing successfully with the reading matter and were able to extract meaning from the words before him, he would move his eyes in steady, progressive, forward steps. But he is not successful; hence he must go back and forth in the attempt to analyze. Again, if his analysis were successful, he would, to be sure, be delayed by the exacting demands of analysis, but he would ultimately make progress. The evidence is clear that analysis is not successful in these cases. The reader does not know what the elements mean, and ultimately his eye-movements take on the character of mere helpless wandering. ✓

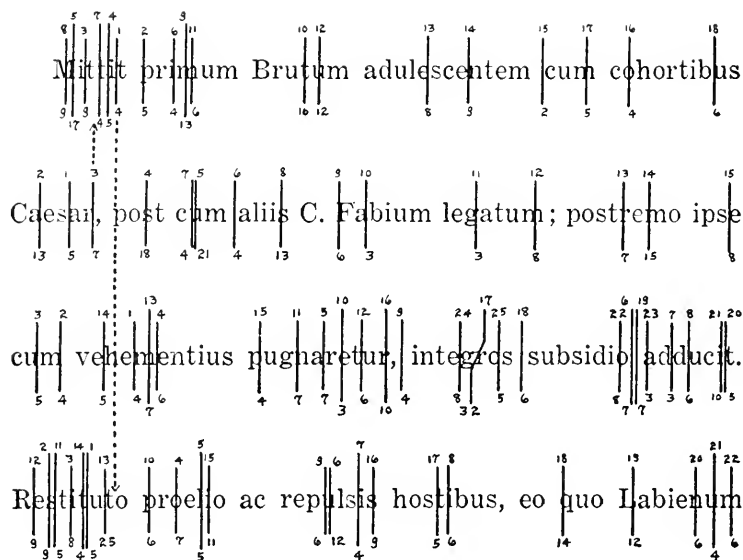


PLATE 81.—Record of Subject A35 reading silently a Latin passage after pronouncing it.

Mittit primum Brutum adolescentem cum cohortibus
 Caesar, post cum aliis C. Fabium legatum; postremo ipse
 cum vehementius pugnaretur, integros subsidio adducit.
 Restituto proelio ac repulsis hostibus, eo quo Labientum

PLATE 82.—Record of Subject A35 translating orally a Latin passage

⁴
² 1 3 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
 cum vehementius pugnaretur, integros subsidio adducit.
₇ 4 11 10 12 2 5 7 8 13 8 4 9 10 15 6 5 6 11 5 3 6

cum vehe

cum veh

cum vehem

cum vehe

um vehemen

vehementiu

ehementius

tius pugna
ius pugnar

pugnaretur

s pugnaret

ugnaretur,

naretur, i

ur, integr

integros

ur, integr

ntegros su

integros su

subsidio

ros subsidi

s subsidio

ubsidio ad

dio adduci

adducit.

o adducit.

pugnare tu

io adducit

adducit.

¹² ² ¹⁷
¹³ ¹¹ ¹⁶ ²⁴ ²⁴ ¹⁴ ²² ³⁵ ²³ ³ ³ ²⁰ ⁶ ²¹ ⁸
 cum vehementius pugnaretur, integros subsidio adducit.
⁹ ⁵ ⁴ ⁴ ¹⁴ ¹⁹ ⁸ ³ ¹⁰ ² ¹⁰ ¹⁰ ³ ⁶ ⁴ ¹⁶ ⁶
⁴

um vehemen
 cum veh tius pugna
 gnaretur,
 aretur, in
 ugnaretur,
 pugnaretu
 us pugnare
 vehementiu

um vehemen
 cum vehe
 cum v
 cum veh

 m vehementi
 ementius p
 cum vehem
 cum vehe
 cum ve
 ehementius pugnaretu
 naretur, in
 vehementiu
 entius pug
 m vehement
 cum veheme

integros s
 ntegros su
 ros subsid
 sidio addu
 ducit.
 io adducit
 o adducit.
 ros subsi
 os subsidi
 hementius
 cum vehem
 sidio adduci
 adducit.

PLATE 84.—Rearrangement of the record of the third line shown in Plate 82

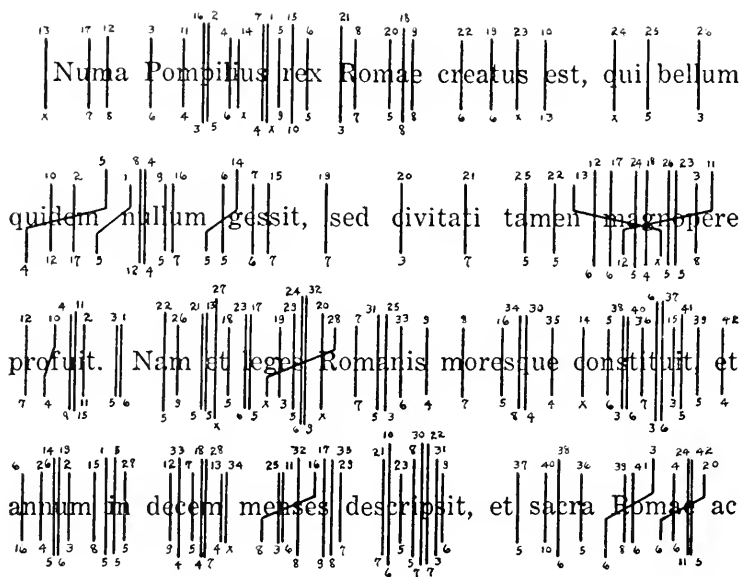


PLATE 85.—Record of Subject A10 reading silently a Latin passage

Numa Pompilius rex Romae creatus est, qui bellum
 quidem nullum gessit, sed civitati tamen magnopere
 profuit. Nam et leges Romanis moresque constituit, et
 annum in decem menses descripsit, et sacra Romae ac

PLATE 86.—Record of Subject A10 translating orally a Latin passage

Mittit primum Brutum adolescentem cum cohortibus

Caesar, post cum aliis C. Fabium legatum; postremo ipse

cum vehementius pugnaretur, integros subsidio adducit.

Restituto proelio ac repulsis hostibus, eo quo Labienum

miserat contendit; cohortes quattuor ex proximo castello

deducit, equitum partem se sequi, partem circumire.

PLATE 87.—Record of Subject A10 pronouncing a Latin passage

Mittit primum Brutum adolescentem cum cohortibus
 Caesar, post cum aliis C. Fabium legatum; postremo ipse
 cum vehementius pugnaretur integros subsidio adducit.
 Restituit proelio ac repulsis hostibus, eo quo Labienum
 miserat contendit; cohortes quattuor ex proximo castello
 deducit, equitum partem se sequi, partem circumire

PLATE 88.—Record of Subject A10 reading silently a Latin passage previously pronounced.

Mittit primum Brutum adolescentem cum cohortibus
 Caesar, post cum aliis C. Fabium legatum; postremo ipse
 cum vehementius pugnaretur, integros subsidio adducit.
 Restituto proelio ac repulsis hostibus, eo quo Labienum
 miserat contendit; cohortes quattuor ex proximo castello
 deducit, equitum partem se sequi, partem circumire

PLATE 89.—Record of Subject A10 translating orally a Latin passage

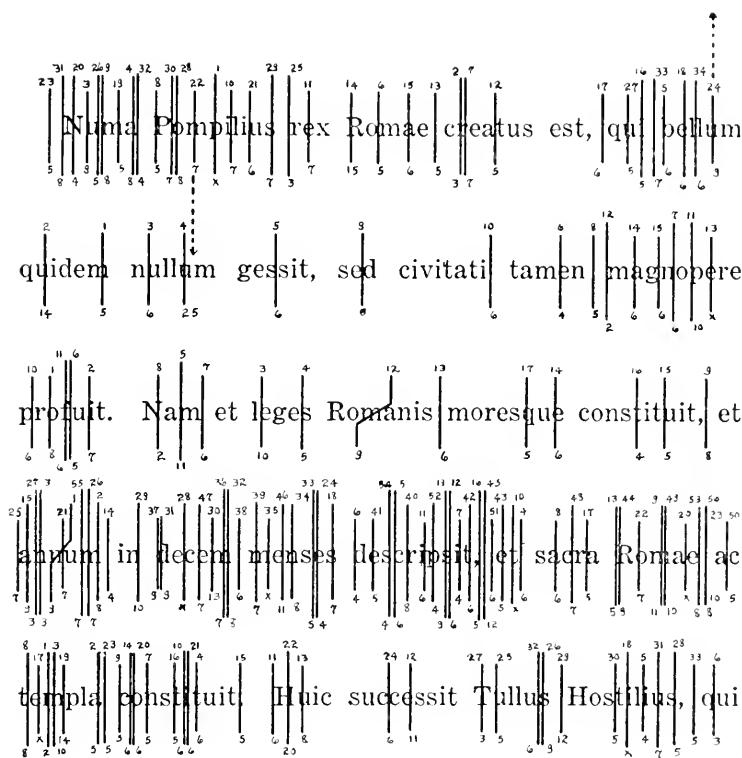


PLATE 90.—Record of Subject A21 reading silently a Latin passage

Latin teachers can hardly escape the responsibility for such an exhibit of wasted, and worse than wasted, human effort. It is not possible to believe that the effects of such mental wandering are good for the student. It is quite impossible to look with any complacency on the mental and nervous disorganization which seems to be the major outcome of two and one-third years of training of Latin students in seven high schools of the first rank.

One's imagination halts before the problem of picturing what must be the eye-movements and the mental state of the students at the bottom of the class.

CHAPTER VI

THE TEACHING OF SILENT READING

The title of this chapter is not intended to arouse the expectation that a list of methods will be described which the teacher can take into the classroom and employ in conducting the work of his or her class. It would, indeed, be a worthy task to enumerate such methods, but before that practical step can be taken with confidence of complete success, it is necessary to lay the scientific foundations for school methods in an account of the mental processes which it is the business of these methods to direct. It has long been recognized that the methods of the primary grades must be formulated to train minds which are at the primary level of maturity. The methods of the high school must, no less, be framed to meet the needs of the high-school state of maturity. The present chapter will aim to elaborate this as the fundamental doctrine which must be understood and accepted by all who strive to contribute in any systematic way to the development of school methods.

History shows that in the field of primary methods much progress has been made through the recognition of psychological distinctions. There was a time when primary reading was wholly confused with spelling. In the days when Noah Webster was the dominant influence in primary teaching in this country the psychological importance of reading for meaning had not been recognized by teachers. The methods of teaching reading were accordingly false, and the results were deplorable. Reading in the upper grades of the Massachusetts schools in Horace Mann's day was in about the stage that Latin reading in American high schools is today.

Horace Mann and his co-workers introduced the distinction between spelling and understanding the meaning of words. As soon as this distinction was clearly recognized, spelling and reading began to be taught by different methods and even at different periods in the day.

With the discrimination between the teaching of the form of words, as in spelling, and the teaching of meaning, as in reading, there came a tendency on the part of many to neglect everything except meaning. There have been many recent forms of this tendency to train in recognition of meaning as the sole task of the teacher of reading. But no one

can go far in the teaching of meaning without recognizing the fact that there must also be training in the methods of distinguishing complex word forms if the child is to master the more difficult steps in reading. It may be well enough to teach primary pupils nothing but words and their meanings so long as these pupils are brought into contact with only short simple words, but sooner or later there must be cultivated a power of discrimination which will make it possible to use with precision an elaborate set of words. Teachers find, therefore, that the distinction between spelling and reading establishes ultimately the educational demand for two indispensable types of training. Neither spelling nor reading can be neglected if the pupil is to succeed at the higher levels. The distinction is thus established and fully operative as a guide to teaching.

Another distinction which experience has shown to be of major importance is the distinction between words that are heard and words that are seen. There may be all kinds of interrelations between visually apprehended words and words apprehended through their sounds. The natural relations in the primary grades, at the beginning of reading, are determined by the fact that the child is by his pre-school training equipped with many sound words which have vivid meanings for him. If visual words are to have vivid meanings, the natural step is to borrow the meanings from oral words and attach them to the visual words.

A further important fact, also quite in accord with all of the teachings of modern behavioristic psychology, is that meanings are related to articulations quite as much as to sounds. The pronunciation of a familiar word carries with it in many cases a vividness of feeling and interpretation that no hearing or seeing of a word can duplicate. Vocal expression is, therefore, a matter which the primary teacher must understand if methods of teaching are to be as effective as possible.

We are at the stage in the development of primary methods where the relations between audition and visual impressions and experiences of articulations are by no means clear in the minds of teachers. Some there are who would have us teach only oral reading. Others are anxious to bring visual reading into prominence and to discard sounds altogether. Out of this confusion must be brought order through careful experimental efforts. There can be little doubt that for certain purposes oral reading is highly important and should be retained. Equally clear is the conclusion that early in his school experience the child should begin to read without sounds in order that he may cultivate fluent methods of reading of the mature type which he will require in the later grades.

There is thus being developed today a new attitude toward reading in the lower grades which is based on distinctions first pointed out by the students of psychology. The importance of the distinction between oral reading and silent reading is not to be underestimated because we are not yet masters of all of the implications of the distinction. The first step has been taken, and the later steps are sure to follow.

We are already far enough along in this development to begin to see the answer to the question, When does silent reading begin to preponderate in importance over oral reading? All of our scientific studies call attention to the radical changes in the reading attitude which come in the fourth and fifth grades. It is here in normal, trained pupils that independent, silent reading begins to take on marked significance as a separate aspect of mental life. The question arises, What are some of the early aspects of strictly silent reading relatively unattached to oral reading? This is followed immediately by the question, What are the obligations of the school in the perfection of these aspects of reading? An earlier contribution to this discussion was made by Terry¹ when he showed that there are important reasons why teachers should give special attention to the reading of arithmetic problems. The reading of such problems is very different from the reading of ordinary prose. Until Terry drew this distinction, the schools assumed in a vague, general way that reading arithmetic problems is simply one manifestation of the pupil's general reading ability. The moment the distinction is drawn, as a result of scientific studies, it follows that special methods must be developed for teaching the reading of arithmetic problems.

In like fashion, the present monograph has shown that there are manifold variations in the reading process induced by changes in subject-matter other than that change with which Terry dealt, and it has also been shown that changes in the attitude of the reader bring about variations in the reading process.

Some of the distinctions which have been here drawn, such, for example, as the distinction between the reading of geography and the reading of simple prose fiction, are of importance to the fourth and fifth grades.

Other distinctions could be made of use in these and subsequent grades if the schools would resolutely face the task of determining experimentally the steps which ought to be taken for the proper training of pupils.

¹ Paul Washington Terry, *How Numerals Are Read: An Experimental Study of the Reading of Isolated Numerals and Numerals in Arithmetic Problems*, Supplementary Educational Monographs, No. 18. Chicago: Department of Education, University of Chicago, 1922.

For example, let us consider an important type of reading which may or may not prove to be appropriate to the middle grades, namely, the type which is exhibited when a reader skims a page in search of a particular item or kind of information? There is no more useful practical ability than that of going rapidly over a page, omitting most of it in order to catch the small items which suit one's immediate purpose. Nor is there any more dangerous habit to acquire than that of skimming. Every possible precaution is necessary if a child is to learn when and how to skim systematically. Yet, who knows the most advantageous date at which to introduce practice in this useful art, and who knows the best methods of systematic skimming?

Another matter of importance is the distinction between asking particular questions before the pupil begins to read and giving him a vague, general notion that some question is going to be asked. We have seen in the chapters of this monograph that the general demand that one prepare to answer questions produces a unique attitude in the reader, but we have no exact information as to the effect of particular questions. We can readily imagine that a reader's attention can be largely controlled by specific preliminary statements, such as this: "When you are through reading, I shall ask you about the geographical location of the story." When the problem of teaching reading under these conditions is proposed, the question is to determine experimentally how and when instruction of this kind should be introduced in the curriculum of the schools.

Again, we may suggest a whole series of problems for the teacher of reading by recalling the fact that a reader's attitude is governed in some measure by the suggestion that he read slowly or rapidly. Suppose that suggestions are given, not directly in verbal form, but through pre-arranged social influences of various types. Suppose, for example, that class competition is used by the teacher to induce rapid reading. What will be the effect? When is such a method of control suitable? How long should it be employed?

Teachers have known for a long time that the process of reading fluently to oneself requires a long period for its perfection, but teachers have not known much about guiding the pupil while he is passing through this period. In fact, the years during which silent reading is maturing have been treated as though they were years of formal and uniform drill. One reads in the books on methodology the statement that the fifth and sixth grades should be devoted to drill in order that the habits acquired in the primary grades may be thoroughly fixed. Such a statement is utterly misleading. Nothing could be less desirable than that

the habits cultivated in the primary grades should become fixed. Most of the primary habits are in the nature of intellectual scaffolding and will have to come down sooner or later. Primary habits should be superseded by mature habits. The fourth grade and the subsequent grades are fruitful periods of education if teachers recognize the unique psychological adjustments that these grades have to work out. To lump together all of these significant adjustments under the blind word "drill" is to attempt to define a complex psychological epoch by a simple, formal name. What school methods will have to do is to break up the word "drill" into a number of separate kinds of happenings. These happenings will be first distinguished by the discriminating mind, but, once they are distinguished, the methodology of these grades will be determined, and the reasons for the variety in methods will become common traditions in the schools.

If one may hazard a general practical conclusion on the basis of the material which has been collected in this monograph, one may distinguish the fourth, fifth, and sixth grades from the primary grades by assigning to the latter training in intelligent oral reading, with gradually increasing emphasis on silent reading. There must be throughout emphasis on apprehension of meaning. To the fourth, fifth, and sixth grades may then be assigned the task of cultivating fluent silent reading of various types in preparation for later elaborate forms of analytical study. The grades immediately above the primary should, under this distinction, be grades of much reading of a variety of material. There will, perhaps, be a period of extensive reading of biography with suggestions as to the items for which one should look. There will, perhaps, be another period when pupils will find out the best ways of getting at scientific materials and absorbing them. There will be a period of training in the reading of mathematical material. This statement should be taken literally as a suggestion that someone write an interesting book on arithmetic intended really to be read. There will be no difficulty in finding many other like topics with which to fill a fruitful program for the reading of the middle grades if teachers will once begin to think in terms of silent reading and its different forms.

The fourth, fifth, and sixth grades are probably not periods of elaborate analytical study. It would seem to be natural to give a great deal of mental content before attempting analysis of content. Such complexities in reading as were outlined in Chapters II and III of this monograph probably ought to be thoroughly mastered before the later processes discussed in Chapter IV are attacked.

One has no right, however, to hold dogmatically to such a suggestion. The scientific attitude toward applications of scientific distinctions is one which leads to experimentation. The only conclusion that can be reached with absolute assurance is that the teaching of the grades above the primary must be directed to a definite, detailed consideration of a series of distinctions that break up silent reading into many different kinds of acts. These many acts require systematic cultivation by methods appropriate to their character.

After mastery comes use. The art of silent reading having been measurably perfected in the fourth, fifth, and sixth grades, the next problem is to carry reading into its various possible applications.

Here we encounter what is perhaps the most dangerous obstruction to a rational reading program, namely, the conventional American textbook. The ordinary textbook is not written to be read. It is made up of compact, abstract statements and lists of items. The student cannot cultivate, while trying to use such material, habits of fluent reading. He will constantly be making analyses in order to get the details of each line. The assumption seems to be that the limitations of the textbook will be overcome during the recitation period when the teacher is supposed to fill in the outline presented in the textbooks with informing illustrations. Even if this assumption were in accordance with practice, reading habits would still suffer from lack of proper cultivation, for the recitation is seldom, if ever, a period of reading.

In sharp contrast with both the recitation and the minute analytical examination of the materials in the textbooks is the library method of getting an education. In the last few years teachers have come to realize that the pupil trained in library methods has a kind of intellectual independence which is most valuable. High schools have shown their appreciation of this new method of instruction by adopting an unsystematized use of the library. Ordinarily teachers do not go with the pupil to the library and guide him in the methods of effective use. They send the pupil and depend on chance for results. Even under these conditions very promising returns come from library assignments.

The fortunate effects of library work are likely to lead in due time to changes of far-reaching importance in school methods. Teachers will soon begin to realize that library methods are not only worth cultivating but also worth cultivating systematically and by carefully formulated methods.

Along with fluent reading of much material will have to be cultivated analytical study. What has been said in earlier chapters regarding

analytical study should not be misunderstood as a plea for the termination of all school efforts to cultivate analysis. There is no justification for the elimination of analysis. What must be done is to find a proper opportunity to perfect analysis. Neither analysis nor reading will be properly cultivated if they are confused with each other. The distinction is of the highest importance as a guide to proper methods.

Numerous examples of the confusion of analysis with reading to the marked disadvantage of both can be found in the schools. The English classics, which are supposed to be read by high-school students in order that they may become acquainted with the best social traditions and ideals of our race, have been prostituted to the uses of grammar and the most formal rhetoric.

Science, which, in the hands of a Huxley, can be made the most fascinating kind of reading, prides itself in some cases on its utter formlessness and its repellent modes of exposition.

As for algebra and geometry, the ordinary teacher would think it strange if one prophesied that some day someone will write a book on these sciences that can be read. Why should this not be possible, as well as that the individual mathematician, when not operating in his professional capacity, should sometimes in a purely personal way give his lay friends a few glimpses into the meaning of Euclidian assumptions and of such mathematical concepts as infinity and zero?

Without attempting to exhaust these remoter possibilities, however, it is perfectly clear, in the light of facts now at hand, that the high school should draw some distinction between reading and analytical study. There is a time and place for each. For example, when a pupil takes up an assignment in history, what shall he do—read it through first fluently and without analysis of details or begin at once to pick out and arrange in order all of the minutiae? It is fair to assume that at the present time the conscientious student considers it almost immoral to read through an assignment rapidly for the sake of getting a general sketchy idea of the whole matter. The only pupil who has the hardihood to read the lesson rapidly is the one who is caught with only a few minutes in which to prepare as best he can for the recitation. Yet it is not only quite moral, but probably very advantageous that the pupil read rapidly the whole assignment before he comes back to detailed analysis.

Again, there is ample justification for a plea that much reading of English classics be encouraged, with all analysis omitted until the pupil gets some habits of appreciation. Suppose that he does not understand every passage the first time he reads it, or even the second time. Let

anyone who has really matured his taste for some aspect of literature describe the pleasure of the discoveries that come with re-reading, and the proper method of dealing with literature in the schools will begin to be understood. The time ought to come in our schools when there will be much reading of belles-lettres in the school unmixed with rhetorical pedantry.

The literary studies which carry the student into foreign languages present many a complex problem. The results of photographic studies of French and Latin reading and analysis reported in this monograph show in a very striking way how the oldest subject of instruction in our high schools has set an extreme example of a type of treatment wholly opposed to reading. Pupils do not read Latin. One can dismiss as absurd under existing conditions the idea that the ordinary pupil ever gets any literary thrills out of Latin. The whole subject has degenerated into an absolutely formal exercise in linguistic dissection. It is doubtful whether this generation of Latin teachers can be made to understand the extent to which they have ruined their subject. If the war had not put an end to the rapidly increasing study of German in the schools, it is doubtful whether Latin could have saved itself, even by this date, from the fate which has overtaken its companion, Greek.

It is nothing less than preposterous for schools to consume the time of students and leave them with the handful of ashes that Latin gives them in its present third year. Latin has lost its vitality. It is a series of barren exercises in analysis of grammatical forms; students are kept busy in the mere piecing together of English words picked out one by one from a vocabulary. It is the example par excellence of lean years of analysis that have fed without profit on all of the accumulations of a child's intellectual life.

It would be less harmful to the school if Latin could be isolated and treated in terms of its own decline. But under existing conditions, it is a source of contagion to the whole school. Latin dominates all of the literary subjects and by its methods contaminates the procedure in every class where its influence is felt. There is a stiff and rigid analytical formalism in much high-school work because teachers in the literary fields think they must be as Latin teachers are.

There must be a time in the study of a language when students and teachers alike want to get some meaning from the text. The French teachers may not be perfect in their art, but the French students show that they are able to read and that they are interested in the story told by the French words. French teachers have had a hard time emancipat-

ing themselves from the Latin traditions. Some of them have not yet achieved liberation, but the time is coming and seems to be at hand when the French teachers will take one fork of the road and leave the Latin teachers to go their lonely way.

With such suggestions as these, the task of the experimental psychologist is to turn over to the schools for fuller refinement and use the distinctions which his laboratory investigations have established. This is not the place where one may properly assume to prescribe school procedure; that task must be left to experimentally accumulated experience. The present study has contributed to teaching methods only indirectly. It has set up distinctions in silent reading and has tried to amplify its own findings by suggesting examples other than those with which it deals directly. It is hoped that the classroom teacher will not be alienated by the fact that the distinctions with which this study has been chiefly concerned were made with the aid of elaborate scientific apparatus. It is always most arduous to draw the initial distinctions in any field. Scientific apparatus is essential to first studies. Once the initial distinctions have been drawn with the aid of rigid scientific studies, the later distinctions become increasingly easy of discovery and description.

The classroom teacher can contribute very largely to the continuation of such studies as are reported in the foregoing pages. In this sense the whole monograph may be said to be aimed at the practical initiation of more precise methods of meeting classroom situations.

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